IDENTIFICATION

Product Code:	MAINDEC-08-DILAC-B-D
Product Name:	LA180 Printer Diagnostic
Date:	July 1976
Maintainer:	Diagnostic Group
Author:	Robert Baker/Bruce Hansen

Table of Contents

1.0 ABSTRACT

The diagnostics for the LA180 printer are designed to exercise all areas of the printer, simulating worse case conditions to detect both mechanical and electrical faults. Additional facilities within the diagnostic program will aid in isolation of any fault conditions detected.

Operation of the diagnostic program will be controlled from the processor switch register or from an available console device. The operator will be given as much control over the operation of the program as possible while trying to keep the control scheme simple.

This diagnostic program was designed to run in 4K or less of memory.

2.0 REQUIREMENTS

2.1 Equipment

This diagnostic was written to run on all models of the PDP-8 processor with a LA180 printer using the standard LA180 parallel interface. The program will use a standard console device, if available, for operator instructions and error reporting. It is suggested that a console device be used when running this diagnostic but it is not required if the CPU has a hardware switch register. If any non-standard IOT codes are used for either the LA180 or the console device, change the IOT codes at PTRIOT and IOTSEL before starting the program.

The diagnostic was made capable of running with either of two interfaces in June of 1976. The first being the standard LA180 parallel interface, and the second being the PDP-8A Option Board i's 12 Bit Parallel I/O Interface.

2.2 Storage

This program uses most of 4K of memory without affecting the area used by the Binary Loader.

2.3 Preliminary Programs

All applicable PDP-08 diagnostics should be run successfully on the processor.

3.0 LOADING PROCEDURE & INITIALIZATION

Load the LA180 diagnostic program following normal procedures.

If a hardware switch register does not exist or to use the software switch register control when a hardware switch register is available, set bit 0 of location 21 to 0 before starting the diagnostic. Location 20 will then be used as the software switch register (SSR). Make sure the SSR is set as desired before starting the program. Refer to Section 5.3 for a description of the dynamic SSR routine operation.

If the PDP-8A Option Board 1's 12 Bit Parallel I/O interface is to be used instead of the standard LA180 Parallel interface, set bit 1 of location 21 to 1 before starting the diagnostic. If the PDP-8A Option Board 1's 12 Bit Parallel I/O interface is to be used, set switch S1-9 on the PDP-8A Option Board 1 to the "ON" position.

Refer to the Test Address Table in the program listing for details on changing the printing test sequence or deleting tests from the diagnostic.

4.0 STARTING PROCEDURES

Starting Addresses:

200 = General Start:
Run operator intervention tests then enter printing test sequence.

201 = Restart:
Enter printing test sequence directly skipping operator intervention tests.

202 = Go directly to console terminal keyboard control - select test.

Starting at 200 will run the entire diagnostic package. The program will first execute the operator intervention tests and then enter the printing test sequence where it will loop continuously. Starting at 201 (the restart) will skip the operator intervention tests and enter the printing test sequence directly. Starting at 202 will cause the program to go directly to console keyboard control if a console device exists, otherwise, the program will halt waiting for a test selection from the processor switch register. Also, by placing the Halt and Select Test switch up (1) before starting the diagnostic, the diagnostic will halt waiting for a test selection from the processor switch register after initialization of the program.

To start the diagnostic program; set the desired starting address in the switch register and depress load address, set the processor switch register options as desired (see section 5.1), and depress start. The diagnostic program will now run in the manner selected.

5,0 OPERATING PROCEDURES

5,1 Switch Register Controls

The following, basic control functions are available through the use of the switch register.

Switch	Position	Function
00	1 (UP)	Stop on Error
	0 (DWN)	Continue on Error
01	1 (UP)	Inhibit Error Typeout
	0 (DWN)	Normal Operation
02	1 (UP)	Loop on Test
	0 (DWN)	Normal Operation
03	1 (UP)	Halt & Select Test
	0 (DWN)	Normal Operation
04		Manual Timing - Overall print speed timing
04	1 (UP)	Single Char - Scope Routine
	0 (DWN)	Full Lines
04-11	# Columns at Start Up.	
06-11	Test Selection During Diag.	
05-11	Char selection for Scope Routine	

5.1.1 Switch 0 = Stop on Error

With this switch up (1), the program will halt or wait for a keyboard on any detected error. When down (0), the program will continue on error if possible.

5.1.2 Switch 1 = Inhibit Error Typeout

Whenever this switch is in the up (1) position, error typeouts will not occur.

5.1.3 Switch 2 = Loop on Test

With this switch up (1), the program will continue to loop on the current test until this switch is placed down (0). After returning this switch to the down (0) position, the test will continue normal operation at the completion of the current test. Thus, whenever this switch is down (0), the program will continue normal operation.

5.1.4 Switch 3 = Halt & Select Test

The program will halt whenever this switch is placed in the up (1) position. At that time, set the desired test number in the proper position in the processor switch register.

To start the normal test sequence with the selected test, place the halt and select test switch down (0) then depress the continue switch.

To run a selected test once and halt, leave the halt and select test switch up (1) and depress continue. The program will execute one complete pass of the selected test, then halt waiting for another test selection. To halt the program during execution of the selected test, place the halt & select test switch down (0) at any time. The program will halt at the completion of the current operation and wait for another test selection.

5.1.5 Switch 4 - Manual Timing

This switch will be used to manually time the overall print speed of the LA180 Printer if a clock option does not exist.

5.1.6 Switch 4 - Single Char/Full Lines Char

This switch will be used to select whether to send only a single character or full lines of characters to the LA180 Printer during Test 61 only.

5.1.7 Selection of Number of Columns

These switches will be used when the program is first started to input the desired, maximum number of columns the diagnostic is to test. The number set must be in octal and be equal to or greater than 2 and less than or equal to 132(10). If the switches are not set within these set limits, the program will default to testing 132(10) columns. Thus, leaving these switches down (000) the program will automatically test the full 132(10) columns.

5.1.8 Test Selection

These switches will be used to select a desired test whenever the halt and select test switch is used to halt the diagnostic program.

5.2 Console Terminal - Keyboard Control

Whenever a console terminal is determined to be available by the program, the diagnostic will be capable of being controlled from the keyboard of the console device. Typing a Rubout (DEL) on the console keyboard at any time will cause the program to stop and print the following message on the console device:

SELECT TEST #:

Type any legal test number followed by one of the following control characters and a carriage return:

Character	Function
. (Period)	Run test once & return to test selection
L	Loop on selected test
S	Start sequence with selected test

The L and S may be either upper or lower case but test numbers must always be entered as 2 digit numbers.

To reset the desired maximum number of columns, type a CONTROL-C (^C) on the console terminal keyboard at any time, the following message will be typed on the console device:

COLUMNS =

Type in the desired number of columns (in decimal) on the console keyboard followed by a carriage-return. If the selected number is less than 2 or greater than 132(10) the message will be repeated and you must renter the number of columns. When a correct number is entered, the program will then ask for a test selection as described previously in this section.

To change the number of columns when waiting for a test selection, type a control-C followed by a carriage return. While inputting a test selection or column number the rubout (DEL) key may be used to delete incorrect entries. At all times switch register control will still be effective, even if using console terminal keyboard control.

5.3 Dynamic Software Switch Register Control

Whenever a console terminal is available and a hardware switch register is not available (or it is desired to use the software switch register instead) set bit zero of location 20 to 0 and the program will recognize the following dynamic software switch register control:

Typing a control-G (BEL) at any time during program execution, except when waiting for a test or column number selection, will cause the diagnostic to stop the current test and type the following message on the console device:

SWR = XXXX NEW =

where XXXX is the current contents of the software switch register (SSR) in octal. The software control routine will then await operator action. The operator is then required to type one or more of the legal characters 1) 0-7, 2) line feed <LF>, 3) carriage return <CR>, 4) control-U <^U>. No check is made for character legality. If the input character is not a LF, CR, or ^U it is assumed to be an octal digit and will be echoed as the digit that is going to be stored in the switches.

To change the contents of the SSR, the operator simply types the new desired value in octal, leading zeros need not be typed. And terminates the input string with a <CR> or <LF> depending on the program action desired as described below. The input value will be truncated to the last 6 digits typed. At least one digit must be typed on any given input string prior to the terminator before a change to the SSR will occur.

When the input string is terminated with a <CR>, the diagnotsic will continue execution from the point at which it was interrupted. If a <CR> is the only thing typed, the program will continue without changing the SSR. If a line feed <LF> is used to terminate the input string, the program will then ask for a test selection as described in Section 5.2.

If a ^U is typed at any point in the input string prior to the terminator, the input value will be disregarded and the prompt message will be retyped.

5.4 Error Reporting

If a console terminal exists and the inhibit error typeout switch is down (0), whenever an error is detected the following error message will be printed on the console device:

```
TEST #XX,  PC=XXXX,  ERROR #XXX,  MESSAGE >>>>>>>>>>
```

The error message indicates the test number, the location where the error occurred, the error number, and the type of error that occurred. For additional information on any error condition, refer to the program listing.

Whenever a console terminal is not available the Halt on Error switch should be used. After an error occurs and the program halts, examine the contents of ERRPC to find the address where the error occurred and ERRNM to find the error number. The test number will be located in either the hardware or software display depending on CPU type. Then refer to the program listing to determine the type of error that occurred and to find any additional information regarding that error. If needed, the error messages are located near the end of the program listing.

6.0 TEST DESCRIPTIONS

6.1 Operator Intervention Tests

This series of tests consists of all tests normally executed which could possible require operator intervention. These tests are executed only once each when the diagnostic is first started up. A detailed description of each test follows:

6.1.1 Test 00 - Interface & Control Tests

This test is designed as a command decode and control interface test and includes checkout of the printer interrupt facility. Manual intervention is required to test the various testable non-ready conditions of the printer. Operator instructions will be printed on the console device if available then the program will wait for the operator to complete the action. Depress the space bar on the console keyboard or the continue switch on the CPU if no console device is available to test the next condition when ready. If any unexpected results are encountered, an error message will be printed on the console device if available. (Refer to section 5.3 on Error Reporting.)

Power should be off on the LA180 before starting this test. The program will first test that the printer is not ready with power off. An instruction will then ask for the printer power to be turned on. Turn power on and make sure there is paper in the printer and the printer is off line. The diagnostic will again check that the printer is not ready. An instruction on the console devide will next inform the operator to turn the LA180 on line. The program will now check that the printer is ready. The next printed instruction will have the operator force a paper out condition by opening the paper feed tractors and removing the paper from the printer. The diagnostic will check that the printer is not ready. The last instruction will ask to restore the printer to on-line by re-inserting paper and clearing the error condition. Make sure the printer is set to on-line before continuing. The program will test to see that the printer is again ready.

The last half of this test will be performed automatically without further manual intervention required. First, a check will be made to see that the PCLF instruction clears the ready flag. A Rubout (DEL) will then be loaded twice to the printer, once using a PSTB instruction and again using a PCLP instruction, to see if loading the character buffer will clear the ready bit. The test will check that the printer ready bit sets within a reasonable amount of time. The final tests will check the printer interrupt system. A check will be made for unexpected interrupts, and if an interrupt occurs with the printer ready bit set. Then a check will be made to see that no interrupt occurs with the printer interrupt enabled and the ready bit set, but the CPU interrupt system off.

6.1.2 Test 01 - Top of Form Switch Test

This test checks all positions of the top of form switch. The program will print instructions for the next setting of the top of form switch on the console terminal (if available) and then wait for the operator to complete the action. After setting the switch, depress the space bar of the console device (or continue on the processor if no console device exists) to test that switch position. After checking all positions, the printer output can be visually verified. A line of all dashes is printed as a starting point and then lines are printed to indicate the proper spacing (in inches) from the previous line to that line.

Example:

```
------------------------------

----- 4.0 INCH FORM FEED -----
```

6.1.3 Test 02 - Print Speed Timing Test

This test is designed to time the LA180 for one full minute while a swirl pattern is printed to the selected maximum number of columns. If a line clock or a programmable clock option is determined to be available by the program, it will be used to automatically time the printer. When neither clock option is available, manual timing will be used and operating instructions will be typed on the console device if it is available. Whichever method of timing is used, at the end of one full minute the approximate print speed will be printed on the LA180 and also on the console device (if available). Remember, the print speed is directly related to the number of columns being printed. Also, the contents of one location in memory will have to be changed if the line frequency is 50 HZ. and a clock option is being used for timing.

6.2 Printing Tests

These tests are designed as a test of the printing mechanism and the associated control logic. At the beginning of each test, a test header will indicate the test number being executed. The test program continually monitors for proper operation of the line printer after each printer operation has been completed, through the printer "ready" line and the setting of the "demand" flag. It should be noted, however, that the "demand" return from the printer is conditional upon the printer "ready". Since the processor can only detect the current condition of the "ready" and "demand" return lines it is necessary to examime the print patterns produced by the various test routines. Each pattern has been chosen for ease of visual verification. Detailed descriptions of each test pattern appears in the description of the following test routines.

6.2.1 Test 20 - Data Transfer Paths Test

This test is designed to test the data lines to and through the interface and to the LA180 Printer. An alternating bit pattern is sent which will print alternating *'s and U's in a checkerboard pattern to the maximum column width. The starting character for each line is alternated and a total of 16 lines are printed.

Example:

```
*U*U*U*U .....      *U*U
U*U*U*U* .....      U*U*
*U*U*U*U .....      *U*U
U*U*U*U* .....      U*U*
```

6.2.2 Test 21 - Head Positioning Test

This test checks the carriage return from all even numbered columns and the spacing of the solenoid head from the left margin. However, the primary purpose of this test is to test the solenoid head position decoder for proper operation.

The test prints a full line of alternating 0's and spaces, starting with a 0. At the end of the line the print head is returned to the left margin with a carriage return. The spaces are then filled in by spacing the print head out from the left margin to the first space, printing an "X", and executing a carriage return. This pattern is repeated until the line is completed. Check to see that all X's are in the middle of the space between the two adjacent zeroes.

Example:

```
0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X
```

6.2.3 Test 22 - Backspace Test

This test is designed to check the backspace feature of the LA180 Printer. Two lines of X's interspaced with dashes will be printed by printing a slash, executing a backspace, and then printing a backslash to complete each X character. A maximum of 127 columns will be printed by this test.

Example:

```
X-X-X-X-X-X-X-X
X-X-X-X-X-X-X-X
```

6.2.4 Test 23 - Character Generator Test

This test checks the space and all 94 printable characters (ASCII codes 040 to 176) by printing a single line, 30 characters long, of each character.

Example:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
   .
   .
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
```

6.2.5 Test 24 - Non-Printable Character Test

This test is designed to test the LA180 handling of non-printable characters and to exercise the full range of the character storage buffer. The test pattern produced will be a 30 line swirl pattern, consisting of full lines of the entire printable character set. If this test is looped on, the pattern will continue a full swirl, rather than only 30 lines and then repeating. As the swirl pattern is produced, a group of printable characters will be shifted (in increments depending on the number of columns being tested) through the full range of the character buffer, starting at the end of the buffer. Non-printable characters will be used to fill the character buffer before and after the group of printable characters for each printed line. All non-printable characters having no control function within the LA180 will be used.

Example:

```
!"#$%&'()*+,-./0123456789:;<=>?@ABC....
"#$%&'()*+,-./0123456789:;<=>?@ABCD....
#$%&'()*+,-./0123456789:;<=>?@ABCDE....
```

6.2.6 Test 25 - Buffer Test

This test is designed to test the character storage buffer in the LA180 for proper operation. This test will produce four lines of print with 2 blank lines between the first and second lines. The lines printed will also serve as a check of printing the correct column width. The patterns are described for 132 columns but will be shortened accordingly for narrower test widths. Before the first line is stored, 16 E's will be loaded into the buffer. Then a rubout (177) will be sent to check that a rubout will clear the buffer. Before each of the last three lines is printed and before the blank lines between the first and second printed lines, the character buffer will be filled with all E's. Thus, an E printed anywhere in the test pattern indicates an error.

The first line will contain 100 ones, 30 threes, and 2 twos. The second printed line will contain 99 zeroes and 33 ones. The third line will consist of the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, 2, and 3 in groups of 10 characters each (except the first group of zeroes will contain only 9 characters). The last line will contain the numbers 1 to 9 then 0 in succession, repeated to the maximum column.

Thus, the column number may be read directly by reading the numbers in any given column on the last three lines, from top to bottom.

```
Column 30 would be      0
                        3
                        0

Column 132 would be     1
                        3
                        2
```

Example:

```
111111111111111111111111111111,....,322


000000000000000000000000000000,....,111
000000000111111111122222222233,....,333
123456789012345678901234567890,....,012
```

6.2.7 Test 26 - Overprint Test

This test is designed to check the spacing and repeatable printing characteristics of the printer. Four lines of characters are each overprinted two times. The rows consist of the following characters alternated across the line.

```
Row 1       E - SP
Row 2      SP - @
Row 3       M - SP
Row 4      SP - #
```

The resulting pattern will be a checkerboard pattern and the overprinted characters should be aligned properly with the initial characters.

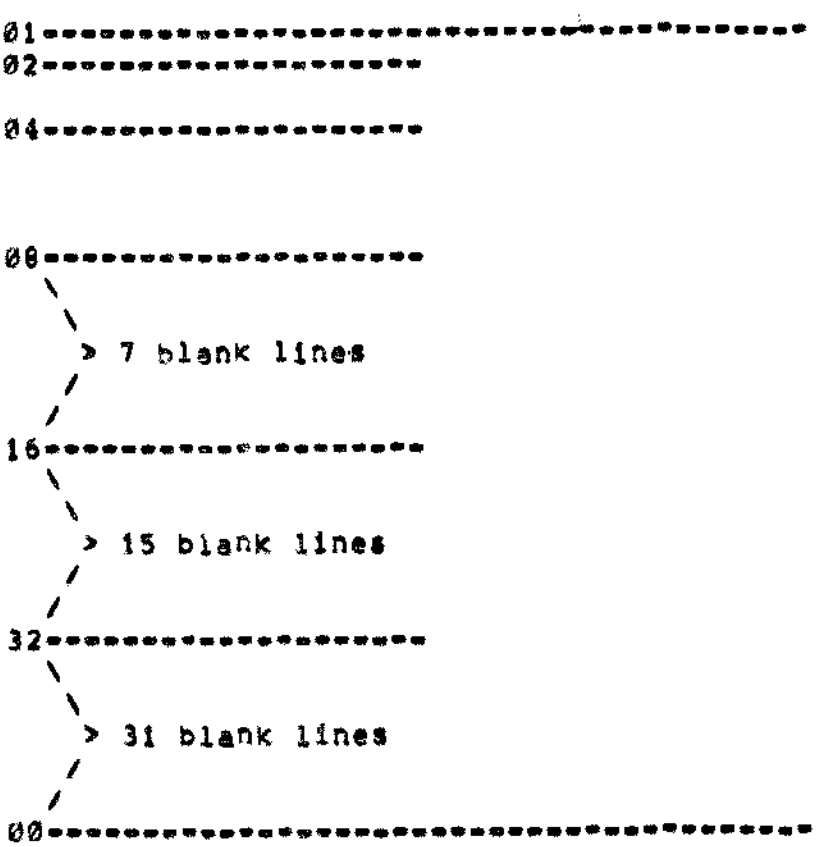
Example:

```
E E E E E E E E E E
 @ @ @ @ @ @ @ @ @ @
M M M M M M M M M M
 # # # # # # # # # #
```

6.2.8 Test 27 - Multiple Line Feed Test

This test checks the line feed capability of the printer by sending various groups of line feeds interspaced with reference lines. The number printed at the left margin of the reference line indicates the number of line feeds that follow. Each line will contain a string of dashes as reference points for measuring, the first and last being 132 characters long (maximum) and the middle lines being 30 characters long.

Example:



6.2.9 Test 30 - Ribbon Feed Test

This test checks the ribbon feed mechanism by printing a single column of 24 lines of X's down the left hand margin of the page. Visually check for proper operation of the ribbon feed mechanism during this test.

Example:

```
X
X
X
.
.
.
X
X
X
```

6.2.10 Test 31 - Bell Test

This test is designed to check the bell code logic and the timing sequence of the micro logic. The test will print "Bell Test" interspaced with bell codes between characters and the following carriage return and line feed functions. A total of five bells will be sounded. This test will also audibly indicate an end of a complete pass through the printing test sequence.

Example:

<BEL> BELL <BEL> <SP> TEST <BEL> <CR>

<BEL> <LF> <BEL> <CR>

6,3 Maintanance Aids

These tests are provided as additional debugging and exercising aids for the LA180 printer. A detailed description of each test follows.

6,3,1 Test 60 - Life Test

This test runs continuously and is run as an individual, special test, and is not part of the standard printing test sequence. This test prints 2 lines of each printable character and then repeats continuously. The second line of each character is overprinted 4 times to conserve paper. At the completion of each pass through the entire printable character set, the pass count will be printed on the A180.

Time for a complete pass, with 132 columns is approximately 10 minutes.

Example:

```
AAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBB
BBBBBBBBBBBBBBBBBBBB
```

6,3,2 Test 61 - Scope Drive Routine

The purpose of this test is to provide the operator with a short but comprehensive scope driver routine for use in trouble shooting the printer and interface control logic with an oscilliscope.

Depending on the setting of the single char/full line switch of the switch register (switch 04) this test will either continually send whatever character is set in the switch register to the line printer, or only send it once and halt. When continuously sending characters, a line feed will be inserted after the maximum column count is reached to print the line. When sending single characters, depress continue to send the character set in the processor switch register. To resume sending continuous characters, place the single char/full line control switch down, set the desired character, and depress continue. To stop sending continuously place the single char/full line switch up and the program will halt waiting for a character selection. When sending individual characters or if sending non-printable characters, no line feeds or carriage returns will be inserted by the program.

6.3.3 Test 62 - Line Print Test

This test continuously prints full lines of whatever character is typed on the console keyboard. To change characters, reselect this test and type another character. An error message will be printed on the LA180 if this test is selected and a console terminal does not exist.

6.3.4 Test 63 - Character Print Test

This test loads whatever character is typed on the console keyboard to the LA180, character by character. All typed characters are echoed to the console device as they are loaded to the LA180. Extra carriage returns or line feeds are echoed to the console device to avoid overprinting lines. If this test is selected and a console terminal does not exist an error message will be printed on the LA180.

```
                    /MAINDEC-08-DILAC-B-L

                    /LA180 PRINTER DIAGNOSTIC

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                    /AUTHOR:        ROBERT BAKER/BRUCE HANSEN









                    /SWITCH REGISTER OPTIONS:

                    /SWITCH NUMBER          DESCRIPTION

                    /       00              STOP ON ERROR

                    /       01              INHIBIT ERROR TYPOUT

                    /       02              LOOP ON TEST

                    /       03              HALT AND SELECT TEST

                    /       04              SINGLE CHAR/FULL LINES - SCOPE ROUTINE
                    /                       MANUAL TIMING - PRINT SPEED TEST

                    /   04 - 11             # COLUMNS AT START UP

                    /   06 - 11             TEST SELECTION

                    /   05 - 11             CHARACTER SELECTION - SCOPE ROUTINE


            0000            *0

0000  0000 0000             0
0001  5402                  JMP I   ISRV            /INTERRUPT SERVICE
0002  0347  ISRV,           IERROR

            0010            *10

0010  0000  AUTPTR, 0                              /AUTO INCREMENT POINTER

            0020            *20

0020  0000  SWITCH, 0000                           /SOFTWARE SWITCH REGISTER
0021  4003  PARAM,  4003                           /SET TO 0003 IF NO HARDWARE SWITCH REG IS AVAILABLE
0022  0000                0000

                    /FLAGS, POINTERS, & STORAGE

0023  0000  TSTNM,  0                              /CURRENT TEST NUMBER
0024  0000  ERRNM,  0                              /ERROR NUMBER
```



```
0025  0000  ERRPC,  0                              /ERROR LOCATION
0026  0000  WIDTH,  0                              /NEGATIVE NUMBER OF COLUMNS

0027  0660  PTRIOT, 0660                           /LA180 IOT CODE - 0XX0
0030  0304  IOTSEL, 0304                           /TTY IOT CODES, XMT - RCV

0031  0000  CHAR,   0                              /CHARACTER STORAGE
0032  0000  CHAR2,  0
0033  0000  SAVE,   0                              /TEMP STORAGE
0034  0000  COUNT,  0                              /WORKING COUNTERS
0035  0000  COUNT2, 0
0036  0000  LPCNT,  0
0037  0000  CKCNT,  0
0040  0000  PASCNT, 0
0041  0000  TABPTR, 0                              /TABLE POINTER
0042  0000  TSTPTR, 0                              /TEST ADDRESS FROM TABLE
0043  0000  MSGADR, 0                              /MESSAGE ADDRESS STORAGE

0044  0000  ONES,   0                              /CONVERSION COUNTERS
0045  0000  TENS,   0
0046  0000  HUNDS,  0
0047  0000  THOUS,  0


0050  0000  STRONE, 0                              /ONE RUN FLAG - SW REG CNTRL
0051  0000  TRONE,  0                              /ONE RUN FLAG - KYBD CNTRL
0052  0000  TLOOP,  0                              /LOOP ON TEST FLAG - KYBD CNTRL

0053  0000  TPFLG,  0                              /TERMINAL AVAILABLE FLAG
                                                   /0 = NO, 7777 = YES   <--   (SET BY THE PROGRAM)

0054  0000  CKFLAG, 0                              /CLOCK OPTION FLAG
                                                   /0 = NONE AVAILABLE, OR DO NOT USE AVAILABLE OPTION


                                                   /IF DK8EA OR DK8EC IS AVAILABLE -
                                                   /SET CKFLAG DEPENDING ON CLOCK FREQ.

                                                   /7773 = 50 HZ - DK8EC
                                                   /7766 = 50 HZ LINE FREQ. - DK8EA
                                                   /7764 = 60 HZ LINE FREQ. - DK8EA
                                                   /7716 = 500 HZ - DK8EC
                                                   /7014 = 5 KHZ - DK8EC

                    /TAGS

0055  4000  TTYPE,  RTYPE
0056  4050  TLOAD,  RLOAD
0057  3123  THOLD,  RHOLD
0060  3105  THLOAD, RHLOAD
0061  4200  TPRINT, RPRINT
0062  4262  TPRHDR, RPRHDR
0063  3600  TERROR, RERROR
0064  3107  TCHECK, RCHECK
0065  3017  TEXIT,  REXIT
0066  3405  TKBDST, KYBDST
```

```
        0067  3054     TSELCT, SELECT
        0070  4600     TTAT,   TAT
        0071  2716     TMIOT,  MIOT
        0072  2600     TKSF,   RKSF
        0073  2605     TKCC,   RKCC
        0074  2610     TKRS,   RKRS
        0075  2613     TKRB,   RKRB
        0076  2616     TTSF,   RTSF
        0077  2623     TTCF,   RTCF
        0100  2626     TTPC,   RTPC
        0101  2631     TTLS,   RTLS
        0102  2634     TPSKF,  RPSKF
        0103  2646     TPCLF,  RPCLF
        0104  2656     TPSTB,  RPSTB
        0105  2670     TPSIE,  RPSIE
        0106  2702     TPCLP,  RPCLP
        0107  3200     TKBFG,  KYBDF
        0110  3465     TTSEL,  TSEL
        0111  4400     READ,   TREAD
        0112  4451     TREADQ, READQ
        0113  4510     CHKOCT, TCKOUT
        0114  4520     CHKNR,  TCHKNR
        0115  4022     GOUT,   OUT
        0116  0333     TDELAY, DELAY
        0117  3713     TCNVRT, CNVRT
        0120  3000     TCKSRV, CKSRV
        0121  4322     TGETSW, RGETSW
        0122  3660     PDIGIT, RPDIGT
        0123  3665     TPOCT,  POCT
        0124  4504     LREADT, READT
        0125  0347     LIERR,  IERROR

                       /CONSTANTS

        0126  0002     P2,     0002
        0127  0007     P7,     0007
        0130  0010     P10,    0010
        0131  0017     P12,    0012
        0132  0015     P15,    0015
        0133  0036     P36,    0036
        0134  0040     P40,    0040
        0135  0041     P41,    0041
        0136  0055     P55,    0055
        0137  0057     P57,    0057
        0140  0060     P60,    0060
        0141  0072     P72,    0072
        0142  0077     P77,    0077
        0143  0100     P100,   0100
        0144  0134     P134,   0134
        0145  0177     P177,   0177
        0146  0200     P200,   0200
        0147  0204     P204,   0204
        0150  0377     P377,   0377
        0151  0400     P400,   0400
        0152  1000     P1000,  1000
```



```
        0153  7777     M1,     7777
        0154  7776     M2,     7776
        0155  7775     M3,     7775
        0156  7774     M4,     7774
        0157  7771     M7,     7771
        0160  7766     M12,    7766
        0161  7763     M15,    7763
        0162  7760     M20,    7760
        0163  7755     M23,    7755
        0164  7753     M25,    7753
        0165  7750     M30,    7750
        0166  7743     M35,    7743
        0167  7742     M36,    7742
        0170  7740     M40,    7740
        0171  7722     M56,    7722
        0172  7700     M100,   7700
        0173  7634     M144,   7634
        0174  7601     M177,   7601

                       /SUBROUTINE CALL EQUATES

              4455             TYPE=JMS I      TTYPE       /TYPE ASCII STRING ON CONSOLE
              5465             EXIT=JMP I      TEXIT       /EXIT TEST
              4456             LOAD=JMS I      TLOAD       /LOAD SINGLE CHAR TO LA180
              4457             HOLD=JMS I      THOLD       /WAIT FOR OPERATOR
              4464             CHECK=JMS I     TCHECK      /CHECK FOR CONTROL
              4463             ERROR=JMS I     TERROR      /ERROR REPORT
              4461             PRINT=JMS I     TPRINT      /PRINT ASCII STRING ON LA180
              4460             MLOAD=JMS I     TMLOAD      /LOAD MULTIPLE CHARS TO LA180
              4521             GETSW=JMS I     TGETSW      /GET SWITCH REGISTER SETTING
              4462             PRTHDR=JMS I    TPRHDR      /PRINT TEST HEADER ON LA180


                       /LINE PRINTER INSTRUCTIONS

              6661             PSKF=6661             /SKIP ON CHAR FLAG
              6662             PCLF=6662             /CLEAR CHAR FLAG
              6664             PSTB=6664             /LOAD BUFFER
              6665             PSIE=6665             /ENABLE INTERRUPT
              6666             PCLP=6666             /CLEAR FLAG & LOAD CHAR


                       /DK8-EA & DK8-EC CLOCK INSTRUCTIONS

              6131             CLEI=6131             /ENABLE CLOCK INTERRUPT
              6132             CLDI=6132             /DISABLE CLOCK INTERRUPT
              6133             CLSK=6133             /SKIP ON CLOCK FLAG, AND CLEAR FLAG

                       /PDP-8A OPTION BOARD #1 PARALLEL I/O INSTRUCTIONS

              6570             DBST=6570             /SKIP ON DATA ACCEPTED AND CLEAR DATA
                                                     /DATA ACCEPTED AND DATA AVAILABLE
              6571             DBSK=6571             /SKIP ON DATA READY
              6572             DBRD=6572             /READ DATA INTO AC 0-11
              6573             DBCF=6573             /CLEAR DATA READY ISSUE DATA ACCEPTED OUT
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        6574            DBTD=6574               /LOAD AC 0-11 INTO BUFFER AND TRANSMIT
        6575            DBSE=6575               /SET PARALLEL I/O INTERRUPT ENABLE
        6576            DBCE=6576               /CLEAR PARALLEL I/O INTERRUPT ENABLE
        6577            DBSD=6577               /ISSUE DATA STROBE PULSE



                /STARTING ADDRESSES

        0200            *200

0200    5210            JMP     START           /GENERAL DIAGNOSTIC STARTING ADR

0201    5213            JMP     RESTRT          /RESTART, SKIP OPR INTERVENTION TESTS

0202    5217            JMP     CONTRL          /GO DIRECTLY TO OPERATOR CONTROL

        0210            *210

0210    7300    START,  CLA CLL                 /CLEAR
0211    3023            DCA     TSTNM           /SET TEST NUMBER TO ZERO
0212    5221            JMP     STARTX          /INITIALIZE
0213    7300    RESTRT, CLA CLL                 /CLEAR
0214    1377            TAD     (20             /GET CONSTANT
0215    3023            DCA     TSTNM           /SET TEST #20
0216    5221            JMP     STARTX          /INITIALIZE
0217    7240    CONTRL, CLA CMA                 /SET AC = -1
0220    3023            DCA     TSTNM           /SET CONTROL FLAG
0221    6002    STARTX, IOF                     /INTERRUPTS OFF
0222    6132            CLDI
0223    7300            CLA CLL
0224    4505            JMS I   TPSIE
0225    4521            GETSW                   /GET SW REG
0226    0150            AND     P377            /SAVE BITS 04-11
0227    7041            CIA                     /NEGATE VALUE
0230    3026            DCA     WIDTH           /STORE # COLUMNS
0231    1126            TAD     P2              /CHECK COLUMN SELECTION
0232    1026            TAD     WIDTH
0233    7740            SMA SZA CLA             /# COLUMNS < 2 ?
0234    5241            JMP     START2          /YES, SET TO 132(10)
0235    1147            TAD     P204            /NO, CHECK AGAIN
0236    1026            TAD     WIDTH
0237    7700            SMA CLA                 /# COLUMNS > 132(10) ?
0240    5243            JMP     .+3             /NO, CONTINUE
0241    1376    START2, TAD     (-204           /SET COLUMN COUNT TO 132(10)
0242    3026            DCA     WIDTH           /STORE VALUE
0243    3052            DCA     TLOOP           /CLEAR PROGRAM FLAGS
0244    3050            DCA     STRONE
0245    3051            DCA     TRONE
0246    1125            TAD     LIERR           /RESET INTERRUPT ERROR
0247    3002            DCA     ISRV
0250    1145            TAD     P177            /SET LA180 READY FLAG
0251    4506            JMS I   TPCLP
0252    4471            JMS I   TMIOT           /SET IOTS FOR TTY & PRINTER
0253    4501            JMS I   TTLS            /CLEAR FLAG
```



```
0254    4333            JMS     DELAY           /WAIT 150 MILLISECONDS
0255    4476            JMS I   TTSF            /SKIP IF FLAG IS SET
0256    7610            SKP CLA                 /AC = 0, NO TERMINAL
0257    7240            CLA CMA                 /AC = -1, TERMINAL EXISTS
0260    3053            DCA     TPFLG           /STORE TERMINAL FLAG
0261    1053            TAD     TPFLG           /CHECK FOR CONSOLE
0262    7640            SZA CLA                 /SKIP IF NONE
0263    5266            JMP     STARTB          /CONTINUE
0264    4461            PRINT                   /PRINT NO CONSOLE MESG ON LA180
0265    5231            NCMSG
0266    7410    STARTB, SKP
0267    5274            JMP     START5
0270    4455            TYPE                    /TYPE TITLE MESSAGE ON TERMINAL
0271    4716            HEADER
0272    1375            TAD     (NOP)           /SKIP TITLE MSG THERE AFTER
0273    3266            DCA     STARTB
0274    1023    START5, TAD     TSTNM           /GET TEST #
0275    7700            SMA CLA                 /WANT CONTROL?
0276    5306            JMP     START7          /NO, CONTINUE
0277    1053    START9, TAD     TPFLG           /YES, TERMINAL THERE
0300    7640            SZA CLA
0301    5466            JMP I   TKBDST          /YES, GO TO KYBD CONTROL
0302    5467            JMP I   TSELCT          /NO, DEFAULT TO SW REG CONTROL
0303    7640    START6, SZA CLA
0304    5277            JMP     START9          /GO TO CONTROL IF NO TEST IN TABLE
0305    2023            ISZ     TSTNM           /INC TEST #
0306    4521    START7, GETSW                   /GET SW REG
0307    0151            AND     P400            /MASK SW3
0310    7640            SZA CLA                 /WANT TEST SELECTION?
0311    5467            JMP I   TSELCT          /YES, GO TO TEST SELECTION HALT
0312    1070            TAD     TTAT            /GET TABLE ADR
0313    1023            TAD     TSTNM           /ADD TEST #
0314    3041            DCA     TABPTR          /STORE POINTER
0315    1441            TAD I   TABPTR          /GET TEST ADDRESS
0316    7550            SNA SPA                 /TEST IN TABLE?
0317    5303            JMP     START6          /NO, INC TEST ADR
0320    3042            DCA     TSTPTR          /YES, STORE TEST ADR
0321    5442            JMP I   TSTPTR          /GO TO TEST





                /ROUTINE TO GET SWITCH SETTINGS

0322    0000    RGETSW, 0
0323    7300            CLA CLL                 /CLEAR AC AND LINK
0324    1021            TAD     PARAM           /CHECK IF HAVE HARDWARE SWR
0325    7710            SPA CLA                 /SKIP IF NO
0326    5331            JMP     .+3
0327    1020            TAD     SWITCH          /GET SOFTWARE SWITCHES
0330    5722            JMP I   RGETSW          /RETURN
0331    7604            LAS                     /GET HARDWARE SWITCHES
0332    5722            JMP I   RGETSW          /RETURN
```

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                        /ROUTINE TO DELAY ABOUT 150 MILLISECONDS
                        /USING INSTRUCTION TIMING.
0333  0000    DELAY,    0
0334  7300              CLA CLL                   /CLEAR
0335  3345              DCA     DELAY0            /SET DELAY COUNT
0336  1374              TAD     (-10
0337  3346              DCA     DELAY1
0340  2345              ISZ     DELAY0            /DELAY
0341  5343              JMP     .+1
0342  2346              ISZ     DELAY1
0343  5340              JMP     .-3
0344  5733              JMP I   DELAY             /RETURN
0345  0000    DELAY0,   0000                      /DELAY COUNTS
0346  7770    DELAY1,   7770
                        /ROUTINE TO REPORT UNEXPECTED INTERRUPTS DURING EXECUTION
0347  4463    IERROR,   ERROR                     /REPORT ERROR
0350  0012              12
0351  5400              JMP I   0                 /RETURN & CONTINUE IF POSSIBLE
0374  7770
0375  7000
0376  7574
0377  0020
      0400              PAGE
                        /OPERATOR INTERVENTION TESTS
                        /TEST 0 - INTERFACE & CONTROL TESTS
                        /TEST READY BIT, PRINTER OFF LINE - POWER OFF
0400  4455    TEST0,    TYPE                      /TYPE INSTRUCTIONS
0401  5250              T0MSG0
0402  4457              HOLD                      /WAIT FOR OPERATOR
0403  4464    T0AC,     CHECK                     /CHECK FOR CONTROL
0404  7300              CLA CLL                   /CLEAR AC AND LINK
0405  1145              TAD     P177              /SEND RUBOUT
0406  4506              JMS I   TPCLP
0407  4516              JMS I   TDELAY            /DELAY 150 MSEC FOR FLAG
0410  4502              JMS I   TPSKF             /SKIP ON READY
0411  5215              JMP     T0AA              /OK, READY CLEAR
0412  4463              ERROR                     /READY SET, POWER OFF
0413  0001              1
0414  5203              JMP     T0AC              /RETEST
                        /TEST READY BIT, PRINTER OFF LINE - POWER ON
0415  4455    T0AA,     TYPE                      /TYPE INSTRUCTIONS, TURN POWER ON
0416  5270              T0MSG1

/MAINDEC-08-DILAC-B-L  PAL10  V142A  20-DEC-76  9:16  PAGE 1-7

0417  4457    T0AB,     HOLD                      /WAIT FOR OPERATOR
0420  4464              CHECK                     /CHECK FOR CONTROL
0421  7300              CLA CLL                   /CLEAR AC AND LINK
0422  1145              TAD     P177              /SEND RUBOUT
0423  4506              JMS I   TPCLP
0424  4516              JMS I   TDELAY            /DELAY 150 MSEC FOR FLAG
0425  4502              JMS I   TPSKF             /SKIP ON READY
0426  5232              JMP     T0B               /OK, READY CLEAR
0427  4463              ERROR                     /READY SET, PRINTER OFF LINE
0430  0002              2
0431  5220              JMP     T0AB              /RETEST
                        /TEST READY BIT, PRINTER ON LINE
0432  4455    T0B,      TYPE                      /TYPE INSTR, TURN ON LINE
0433  5302              T0MSG2
0434  4457              HOLD                      /WAIT FOR OPERATOR
0435  4464    T0C,      CHECK                     /CHECK FOR CONTROL
0436  7300              CLA CLL                   /CLEAR AC AND LINK
0437  1145              TAD     P177              /SEND RUBOUT
0440  4506              JMS I   TPCLP
0441  4516              JMS I   TDELAY            /DELAY 150 MSEC FOR FLAG
0442  4502              JMS I   TPSKF             /SKIP ON READY
0443  5253              JMP     .+10              /READY NOT SET
0444  4777*             JMS     OP1CHK            /CHECK TO SEE IF PARALLEL I/O
0445  0447              .+2                       /WAS PARALLEL I/O
0446  5256              JMP     T0E               /OK-READY SET
0447  1145              TAD     P177              /RESET DATA ACCEPTED FLAG
0450  4506              JMS  I  TPCLP             /GO LOAD THE BUFFER
0451  4516              JMS  I  TDELAY
0452  5256              JMP     T0E               /CONTINUE THE TEST
0453  4463              ERROR                     /READY CLEAR, PRINTER ON LINE
0454  0003              3
0455  5235              JMP     T0C               /RETEST
                        /TEST PAPER OUT SWITCH
0456  4455    T0E,      TYPE                      /TYPE INSTR, PAPER OUT
0457  5320              T0MSG3
0460  4457              HOLD                      /WAIT FOR OPERATOR
0461  4464    T0F,      CHECK                     /CHECK FOR CONTROL
0462  4461              PRINT
0463  5440              LF                        /SEND LF
0464  4516              JMS I   TDELAY            /DELAY FOR 150 MSEC
0465  4502              JMS I   TPSKF             /SKIP ON READY
0466  5272              JMP     T0H               /OK, READY CLEAR
0467  4463              ERROR                     /READY SET, PAPER OUT, ON LINE
0470  0004              4
0471  5261              JMP     T0F               /RETEST
                        /TEST ABILITY TO CLEAR ERROR CONDITION
0472  4455    T0H,      TYPE                      /TYPE INSTR, RESET & ON LINE
0473  5335              T0MSG4
0474  4457              HOLD                      /WAIT FOR OPERATOR
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0475  4464   T01,   CHECK                /CHECK FOR CONTROL
0476  7300          CLA CLL              /CLEAR AC AND LINK
0477  1145          TAD     P177         /SEND RUBOUT
0500  [illegible]   JMS I   [illegible]
0501  4516          JMS I   TDELAY       /DELAY 150 MSEC FOR FLAG
0502  4502          JMS I   TPSKF        /SKIP ON READY
0503  7410          SKP
0504  5310          JMP     T0K          /OK, READY SET
0505  4463          ERROR                /READY NOT SET
0506  0005          5
0507  5275          JMP     T0I          /RETEST

              /TEST ABILITY TO CLEAR READY FLAG

0510  4464   T0K,   CHECK                /CHECK FOR CONTROL
0511  4503          JMS I   TPCLF        /CLEAR FLAG
0512  4502          JMS I   TPSKF        /SKIP ON CHAR FLAG
0513  5317          JMP     T0L          /OK, FLAG CLEAR
0514  4463          ERROR                /FLAG DID NOT CLEAR
0515  0006          6
0516  5310          JMP     T0K          /RETEST

              /TEST THAT SENDING CHAR WILL RESET READY FLAG

0517  4464   T0L,   CHECK
0520  7300          CLA CLL
0521  1145          TAD     P177         /GET RUBOUT
0522  4504          JMS I   TPSTB        /LOAD CHAR
0523  4516          JMS I   TDELAY       /WAIT 150 MSEC
0524  4502          JMS I   TPSKF        /SKIP ON CHAR FLAG
0525  7410          SKP
0526  5332          JMP     T0M
0527  4463          ERROR                /READY DID NOT SET
0530  0007          7
0531  5310          JMP     T0K          /RETEST CLEAR & SET FLAG

              /TEST AGAIN USING SINGLE INSTR

0532  4464   T0M,   CHECK                /CHECK FOR CONTROL
0533  4776'         JMS     SETSKP       /GO SETUP FOR SKIP IOT  TO BE USED
0534  1145          TAD     P177         /SET RUBOUT
0535  4506          JMS I   TPCLP        /LOAD CHAR
0536  6661   T0MIOT, PSKF/DBST           /SKIP ON CHAR FLAG
0537  5343          JMP     T0N          /OK, FLAG CLEAR
0540  4463          ERROR                /FLAG DID NOT CLEAR
0541  0010          10
0542  5332          JMP     T0M          /RETEST
0543  4516   T0N,   JMS I   TDELAY       /DELAY 150 MSEC
0544  4502          JMS I   TPSKF        /SKIP ON CHAR FLAG
0545  7410          SKP
0546  5352          JMP     T0O          /OK, FLAG SET
0547  4463          ERROR                /FLAG DID NOT SET
0550  0011          11
0551  5332          JMP     T0M          /RETEST
```



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              /CHECK FOR UNEXPECTED INTERRUPTS

0552  4464   T0O,   CHECK                /CHECK FOR CONTROL
0553  7300          CLA CLL
0554  1375          TAD     (T0P         /SET INT RETURN
0555  3002          DCA     ISRV
0556  4473          JMS I   TKCC
0557  4477          JMS I   TTCF         /CLEAR CONSOLE PTR FLAG
0560  4503          JMS I   TPCLF        /CLEAR LA180 READY BIT
0561  7300          CLA CLL
0562  4505          JMS I   TPSIE        /DISABLE LA180 INTERRUPT
0563  6001          ION                  /ENABLE INTERRUPT SYSTEM
0564  7000          NOP
0565  7000          NOP
0566  6002          IOF                  /DISABLE INTERRUPT SYSTEM
0567  5773          JMP I   LT0Q         /OK, CONTINUE
0570  4463   T0P,   ERROR                /UNEXPECTED INTERRUPT
0571  0012          12
0572  5352          JMP     T0O          /RETEST
0573  0600   LT0Q,  T0Q
0575  0570
0576  1540
0577  3142
      0600          PAGE

              /CHECK THAT NO INTERRUPT OCCURS WITH READY BIT CLEAR

0600  4464   T0Q,   CHECK                /CHECK FOR CONTROL
0601  7300          CLA CLL
0602  1377          TAD     (T0R         /SET INTERRUPT RETURN
0603  3002          DCA     ISRV
0604  4473          JMS I   TKCC
0605  4477          JMS I   TTCF         /CLEAR CONSOLE PTR FLAG
0606  4503          JMS I   TPCLF        /CLEAR LA180 READY BIT
0607  7201          CLA IAC
0610  4505          JMS I   TPSIE        /ENABLE LA180 INTERRUPT
0611  6001          ION                  /ENABLE INTERRUPT SYSTEM
0612  7000          NOP                  /DELAY 2 INSTRUCTION TIMES
0613  7000          NOP
0614  6002          IOF                  /DISABLE INTERRUPT SYSTEM
0615  7300          CLA CLL
0616  4505          JMS I   TPSIE        /DISABLE LA180 INTERRUPT
0617  5225          JMP     T0S

0620  7300   T0R,   CLA CLL
0621  4505          JMS I   TPSIE        /DISABLE LA180 INTERRUPT
0622  4463          ERROR                /INTERRUPT WITH READY BIT CLEAR
0623  0013          13
0624  5200          JMP     T0Q          /RETEST

              /CHECK THAT INTERRUPT OCCURS WITH READY BIT SET

0625  4464   T0S,   CHECK                /CHECK FOR CONTROL
0626  7300          CLA CLL
0627  1376          TAD     (T0W         /SET INTER RETURN
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                0630  3402          DCA     ISRV
                0631  1145          TAD     P177            /SEND CHAR TO SET FLAG
                0632  4506          JMS I   TPCLP
                0633  4775'         JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
                0634  0640          .+4                     /ON PARALLEL I/O - GO DELAY
                0635  4502          JMS I   TPSKF           /SKIP ON READY
                0636  5235          JMP     .-1             /WAIT FOR READY
                0637  7410          SKP
                0640  4516          JMS  I  TDELAY
                0641  4473          JMS I   TKCC
                0642  4477          JMS I   TTCF            /CLEAR CONSOLE PTR FLAG
                0643  7201          CLA IAC
                0644  4505          JMS I   TPSIE           /ENABLE LA180 INTERRUPT
                0645  6001          ION                     /ENABLE INTERRUPT SYSTEM
                0646  7000          NOP                     /WAIT 2 INSTR TIMES
                0647  7000          NOP
                0650  6002          IOF                     /DISABLE INTERRUPT SYSTEM
                0651  7300          CLA CLL
                0652  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
                0653  4463          ERROR                   /DID NOT INTER, READY SET
                0654  0014          14
                0655  5225          JMP     T0S             /RETEST
                0656  7300  T0N,     CLA CLL
                0657  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
                                    /TEST NO INTERRUPT OCCURS WITH LA180 INTERRUPT ENABLED, READY SET,
                                    /BUT CPU INTERRUPT SYSTEM OFF.
                0660  4464  T0U,     CHECK                   /CHECK FOR CONTROL
                0661  7300          CLA CLL
                0662  1374          TAD     (T0V            /SET INTER RETURN ADR
                0663  3002          DCA     ISRV
                0664  1145          TAD     P177            /SEND CHAR TO SET FLAG
                0665  4506          JMS I   TPCLP
                0666  4775'         JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
                0667  0673          .+4                     /ADDRESS FOR PARALLEL I/O - DELAY
                0670  4502          JMS I   TPSKF           /WAIT FOR READY
                0671  5270          JMP     .-1
                0672  7410          SKP
                0673  4516          JMS  I  TDELAY          /DELAY TO ALLOW FLAG TO SET
                0674  4473          JMS I   TKCC
                0675  4477          JMS I   TTCF            /CLEAR CONSOLE PTR FLAG
                0676  7201          CLA IAC
                0677  4505          JMS I   TPSIE           /ENABLE LA180 INTERRUPT
                0700  7000          NOP                     /WAIT 2 INSTR TIMES
                0701  7000          NOP
                0702  7300          CLA CLL
                0703  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
                0704  1125          TAD     LIERR           /SET INTERRUPT ERROR ADR
                0705  3002          DCA     ISRV
                0706  5465          EXIT                    /EXIT TEST
                0707  7300  T0V,     CLA CLL
                0710  4505          JMS I   TPSIE           /DISABLE LA180 INTERRUPT
                0711  4463          ERROR                   /INTERRUPT WITH SYSTEM DISABLED
```



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                0712  0015          15
                0713  5260          JMP     T0U             /RETEST
                                    /TEST 1 - TOP OF FORM SWITCH TEST
                0714  4462  TEST1,  PRTHDR                  /PRINT TEST HEADER
                0715  1373          TAD     (T1TAB
                0716  3041          DCA     TABPTR          /STORE TABLE POINTER
                0717  1165          TAD     M30
                0720  3034          DCA     COUNT           /SET DASH COUNT
                0721  1136          TAD     P55             /SET DASH CHAR
                0722  4460          MLOAD                   /LOAD DASHED LINE
                0723  4461          PRINT
                0724  5437          CR                      /PRINT LINE
                0725  4455  T1A,     TYPE                    /TYPE INSTRUCTIONS
                0726  5375          T1MSG3                  /SET SWITCH SETTING FOR MSG
                0727  1041          TAD     TABPTR
                0730  3332          DCA     .+2
                0731  4455          TYPE
                0732  0000          0
                0733  4455          TYPE                    /FINISH INSTR
                0734  5412          T1MSG4
                0735  4457          HOLD                    /WAIT FOR OPERATOR
                0736  4464          CHECK                   /CHECK FOR CONTROL
                0737  4461          PRINT                   /ISSUE FF
                0740  5442          FF
                0741  4461          PRINT                   /PRINT REFERENCE LINE
                0742  5365          T1MSG1
                0743  1041          TAD     TABPTR          /SET FF LENGTH FOR MESG
                0744  3346          DCA     .+2
                0745  4461          PRINT
                0746  0000          0
                0747  4461          PRINT                   /FINISH MESG
                0750  5361          T1MSG2
                0751  2041          ISZ     TABPTR          /INC TABLE POINTER
                0752  2041          ISZ     TABPTR
                0753  1441          TAD I   TABPTR          /CHECK TABLE TO SEE IF DONE
                0754  7640          SZA CLA
                0755  5325          JMP     T1A             /CONTINUE
                0756  4461          PRINT
                0757  5440          LF                      /ADVANCE PAPER
                0760  5465          EXIT                    /EXIT

                0773  5447
                0774  0707
                0775  3142
                0776  0656
                0777  0620
                      1000          PAGE
                                    /TEST 2 - PRINT SPEED TIMING TEST
                                    /
                                    /A SWIRL PATTERN IS PRINTED FOR ONE FULL MINUTE
                                    /WHILE THE NUMBER OF LINES PRINTED IS COUNTED.
                                    /TIMING WILL BE DONE BY DK8-EA OR DK8-EC CLOCK
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                        /OPTION IF EITHER IS AVAILABLE AND LOCATION
                        /CKFLAG IS PRESET WITH THE TIME COUNT.
                        /IF CKFLAG IS ZERO, MANUAL TIMING WILL BE USED TO
                        /OBTAIN AN APPROXIMATE PRINT TIMING.
                        /IF A HARDWARE SWITCH REGISTER IS NOT AVAILABLE, THIS TEST
                        /CANNOT BE RUN WITHOUT A CLOCK OPTION BEING AVAILABLE.
                        /THE PROGRAM WILL AUTOMATICALLY SKIP THIS TEST IF IT CANNOT BE RUN.

        1000  4462      TEST2,  PRTHDR                  /PRINT TEST HEADER
        1001  3640              DCA     PASCNT          /CLEAR PASS COUNT (LINE COUNT)
        1002  1054              TAD     CKFLAG          /CLOCK OPTION AVAILABLE?
        1003  7640              SZA CLA
        1004  5230              JMP     T2C             /YES, GO TO CLOCK SET-UP
        1005  1021              TAD     PARAM           /HAVE HARDWARE SWITCH REGISTER?
        1006  7710              SPA CLA
        1007  5215              JMP     T2A             /YES, CONTINUE
        1010  4461              PRINT                   /NO, PRINT ERROR MESG
        1011  5151              T2EM
        1012  4455              TYPE
        1013  5151              T2EM
        1014  5465              EXIT                    /EXIT TEST

                        /MANUAL TIMING START-UP

 [illegible]  4455      T2A,    TYPE                    /PRINT INSRTUCTIONS
 [illegible]  5067              T2M1
        1017  4455              TYPE
        1020  5105              T2M2
        1021  4455              TYPE
        1022  5126              T2M3
        1023  4521      T2B,    GETSW                   /GET SWITCHES
        1024  0146              AND     P200            /MASK SWITCH 4
        1025  7650              SNA CLA                 /START? - SWITCH UP?
        1026  5223              JMP     T2B             /NO, WAIT FOR SWITCH TO GO UP
        1027  5244              JMP     T2SP            /YES, START PRINTING

                        /CLOCK OPTION START-UP

        1030  1377      T2C,    TAD     (6650           /SET TIME COUNT FOR ONE MINUTE
        1031  3036              DCA     LPCNT
        1032  1120              TAD     TCKSRV
        1033  3002              DCA     ISRV
        1034  1054              TAD     CKFLAG
        1035  3037              DCA     CKCNT
        1036  4473              JMS I   TKCC
        1037  4477              JMS I   TTCF
        1040  7300              CLA CLL
        1041  4505              JMS I   TPSIE           /DISABLE PRINTER INTERRUPT
        1042  6131              CLEI                    /SET CLOCK INTERRUPT ENABLE
        1043  6001              ION                     /INTERRUPT SYSTEM ON

                        /PRINTING ROUTINE FOR TEST 2

        1044  7201      T2SP,   CLA IAC                 /SET START CHAR
        1045  1134              TAD     P40
```



```
        1046  3032              DCA     CHAR2           /SAVE IT
        1047  1032      T2PA,   TAD     CHAR2           /GET START CHAR
        1050  3031              DCA     CHAR            /SET CHARACTER TO BE LOADED
        1051  1026              TAD     WIDTH           /SET COLUMN COUNT
        1052  3034              DCA     COUNT
        1053  1031      T2PC,   TAD     CHAR            /GET CHAR
        1054  4456              LOAD                    /LOAD CHAR
        1055  2034              ISZ     COUNT           /INC CHAR COUNT
        1056  7410              SKP                     /CONTINUE LINE
        1057  5270              JMP     T2PD            /SEND LF IF END OF LINE
        1060  2031              ISZ     CHAR            /SET NEXT CHAR
        1061  1174              TAD     M177            /CHECK CHAR
        1062  1031              TAD     CHAR
        1063  7640              SZA CLA
        1064  5253              JMP     T2PC            /OK, CONTINUE
        1065  1134              TAD     P40             /RESET CHAR TO SPACE
        1066  3031              DCA     CHAR            /STORE NEW CHAR
        1067  5253              JMP     T2PC            /CONTINUE
        1070  4461      T2PD,   PRINT                   /SEND LF TO PRINT LINE
        1071  5440              LF
        1072  2040              ISZ     PASCNT          /INC LINE COUNT
        1073  1054              TAD     CKFLAG          /USING CLOCK?
        1074  7640              SZA CLA
        1075  5302              JMP     T2PE            /YES, BYPASS MANUAL TIMING
        1076  4521              GETSW                   /GET SWITCH REGISTER
        1077  0146              AND     P200            /MASK SWITCH 4
        1100  7650              SNA CLA                 /STILL UP?
        1101  5314              JMP     T2SPD           /NO, EXIT PRINTING ROUTINE - PRINT COUNT
        1102  2032      T2PE,   ISZ     CHAR2           /SET NEW START CHAR (SWIRL)
        1103  1174              TAD     M177            /CHECK CHAR
        1104  1032              TAD     CHAR2
        1105  7640              SZA CLA
        1106  5247              JMP     T2PA            /OK, CONTINUE
        1107  5244              JMP     T2SP            /RESET START CHAR

                        /ROUTINE TO PRINT NUMBER OF LINES PRINTED

        1110  6002      T2SPDC, IOF                     /INTERRUPT SYSTEM OFF
        1111  6132              CLDI                    /DISABLE CLOCK INTERRUPT
        1112  1125              TAD     LIERR           /RESET UNEXPECTED INTERRUPT ERROR
        1113  3002              DCA     ISRV
        1114  7300      T2SPD,  CLA CLL                 /CLEAR AC AND LINK
        1115  1145              TAD     P177            /GET RUBOUT
        1116  4456              LOAD                    /CLEAR LA180 BUFFER
        1117  4455              TYPE                    /START MESG
        1120  5171              PRSP1
        1121  4461              PRINT
        1122  5171              PRSP1
        1123  1054              TAD     CKFLAG          /CHECK IF USED CLOCK
        1124  7640              SZA CLA
        1125  5332              JMP     T2S1            /YES, SKIP WORD "APPROX"
        1126  4455              TYPE                    /NO, ADD WORD "APPROXIMATE" TO MESG
        1127  5202              PRSP2
        1130  4461              PRINT
        1131  5202              PRSP2
```

```
                                T2S1,   TAD     PASCNT          /GET LINE COUNT
                                        JMS I   TCNVRT          /CONVERT NUMBER TO ASCII MESG
                                        PRINT                   /PRINT IT
                                        CNVMSG
                                        TYPE
                                        CNVMSG
                                        PRINT                   /PRINT MORE OF MESG
                                        PRSP3
                                        TYPE
                                        PRSP3
                                        TAD     WIDTH           /GET # OF COLUMNS
                                        CIA
                                        JMS I   TCNVRT          /CONVERT IT TO ASCII MESG
                                        PRINT
                                        CNVMSG
                                        TYPE
                                        CNVMSG
                                        PRINT
                                        PR&P4                   /FINISH MESG & PRINT
                                        TYPE
                                        PR&P4
                                        EXIT                    /EXIT TEST

                                        PAGE

                                /PRINTING TESTS


                                /TEST 20 - DATA TRANSFER PATHS TEST
                                /
                                /THIS TEST PRINTS 16 LINES OF ALTERNATING X'S AND U'S IN A
                                /CHECKERBOARD PATTERN

                        4462    TEST20, PRTHDR                  /PRINT TEST HEADER
                                        TAD     M20             /SET LINE COUNT FOR 16 LINES
                                        DCA     LPCNT           /STORE COUNT
                                T20A,   TAD     WIDTH           /GET # COLUMNS
                                        DCA     COUNT           /STORE
                                        IAC                     /CHECK LINE COUNT
                                        AND     LPCNT
                                        SZA CLA                 /START CHAR =?
                                        JMP     T20C            /START WITH "U"
                                T20B,   TAD     (52             /GET "*" CHAR CODE
                                        LOAD                    /LOAD *
                                        ISZ     COUNT           /INC CHAR COUNT
                                        SKP                     /CONTINUE
                                        JMP     T20D            /PRINT LINE IF DONE LOAD
                                T20C,   TAD     (125            /GET "U" CHAR CODE
                                        LOAD                    /LOAD CHAR
                                        ISZ     COUNT           /INC CHAR COUNT
                                        JMP     T20B            /CONTINUE LOAD
                                T20D,   PRINT                   /PRINT LINE WHEN DONE LOAD
                                        LF                      /ADVANCE PAPER
                                        ISZ     LPCNT           /INC LINE COUNT
```



```
                                        JMP     T20A            /FINISH TEST
                                        EXIT                    /EXIT

                                /TEST 21 - HEAD POSITIONING TEST
                                /
                                /THIS TEST PRINTS A SINGLE LINE OF ALTERNATING 0'S AND SPACES
                                /THEN FILLS IN THE SPACES WITH X'S ONE AT A TIME

                        4462    TEST21, PRTHDR                  /PRINT TEST HEADER
                                        TAD     WIDTH           /GET # COLUMNS
                                        DCA     COUNT           /STORE
                                T21B,   TAD     P60             /LOAD 0
                                        LOAD
                                        ISZ     COUNT           /INC CHAR COUNT, DONE?
                                        SKP                     /NO, SEND SPACE
                                        JMP     T21C            /YES, SEND CR - PRINT LINE
                                        TAD     P40             /LOAD SPACE
                                        LOAD
                                        ISZ     COUNT           /INC COUNT, DONE?
                                        JMP     T21B            /NO, CONTINUE LOAD
                                T21C,   PRINT                   /YES, PRINT LINE
                                        CR
                                        CLA CMA                 /SET AC=-1
                                        DCA     T21W            /STORE SPACE COUNT
                                T21D,   TAD     T21W            /SAVE SPACE COUNT
                                        DCA     COUNT
                                        TAD     P40             /GET SPACE
                                        MLOAD                   /LOAD SPACES
                                        TAD     (130            /GET X CHAR CODE
                                        LOAD                    /LOAD IT
                                        PRINT                   /PRINT LINE
                                        CR
                                        TAD     M2              /ADD 2 TO SPACE COUNT
                                        TAD     T21W
                                        DCA     T21W            /STORE NEW COUNT
                                        CLA CMA                 /SET AC=-1
                                        TAD     T21W            /SUBTRACT SPACE COUNT
                                        CIA                     /MAKE IT POSITIVE
                                        TAD     WIDTH           /ADD # COLUMNS
                                        SPA SNA CLA             /DONE LINE?
                                        JMP     T21D            /NO CONTINUE
                                        PRINT                   /ADVANCE PAPER
                                        LF
                                        EXIT                    /EXIT

                        0000    T21W,   0

                                /TEST 22 - BACKSPACE TEST
                                /
                                /TWO LINES OF X'S INTERSPACED WITH DASHES
                                /WILL BE PRINTED BY PRINTING A SLACH, EXECUTING A BACKSPACE,
                                /AND THEN PRINTING A BACKSLASH TO COMPLETE EACH X CHAR,
                                /A MAX, OF 127 COLUMNS WILL BE PRINTED.

                        4462    TEST22, PRTHDR                  /PRINT TEST HEADER
```

```
 877   1275  1354          TAD     M2              /SET LINE COUNT
 878   1276  3036          DCA     LPCNT           /STORE COUNT
 879   1277  1026  T22A,   TAD     WIDTH           /GET # COLUMNS
 880   1300  1145          TAD     P177            /OVER 127?
 881   1301  7710          SPA CLA
 882   1302  5305          JMP     .+3
 883   1303  1026          TAD     WIDTH
 884   1304  7410          SKP
 885   1305  1177          TAD     M177            /YES, SET TO 127
 886   1306  3034          DCA     COUNT           /STORE COUNT
 887   1307  1137  T22B,   TAD     P57             /GET "/" CODE
 888   1310  4456          LOAD                    /LOAD
 889   1311  1130          TAD     P10             /GET BACKSPACE CODE
 890   1312  4456          LOAD                    /LOAD
 891   1313  1144          TAD     P134            /GET "\" CODE
 892   1314  4456          LOAD                    /LOAD
 893   1315  2034          ISZ     COUNT           /INC COLUMN COUNT
 894   1316  7410          SKP                     /CONTINUE IF NOT DONE
 895   1317  5324          JMP     T22C            /PRINT LINE IF DONE
 896   1320  1136          TAD     P55             /GET DASH
 897   1321  4456          LOAD                    /LOAD
 898   1322  2034          ISZ     COUNT           /INC COUNT, DONE?
 899   1323  5307          JMP     T22B            /NO, CONTINUE
 900   1324  4461  T22C,   PRINT                   /YES, PRINT LINE
 901   1325  5440          LF
 902   1326  2036          ISZ     LPCNT           /INC LINE COUNT, DONE?
 903   1327  5277          JMP     T22A            /NO, CONTINUE
 904   1330  5465          EXIT                    /YES, EXIT
 905
 906                 /TEST 23 - CHARACTER GENERATOR TEST
 907                 /
 908                 /THIS TEST PRINTS A SINGLE LINE (30 CHARACTERS LONG) OF EACH
 909                 /PRINTABLE CHARACTER PRECEEDED BY A LINE OF ALL SPACES
 910
 911   1331  4462  TEST23, PRTHDR                  /PRINT TEST HEADER
 912   1332  1134          TAD     P40             /SET START CHAR (SPACE)
 913   1333  3031          DCA     CHAR            /STORE IT
 914   1334  1167  T23A,   TAD     M36             /SET COLUMN COUNT = 30
 915   1335  3034          DCA     COUNT           /STORE IT
 916   1336  1031          TAD     CHAR            /GET CHAR
 917   1337  4460          MLOAD                   /LOAD LINE
 918   1340  4461          PRINT                   /PRINT IT
 919   1341  5440          LF
 920   1342  2031          ISZ     CHAR            /SET NEXT CHAR
 921   1343  1174          TAD     M177            /CHECK CHAR
 922   1344  1031          TAD     CHAR
 923   1345  7640          SZA CLA                 /DONE TEST?
 924   1346  5334          JMP     T23A            /NO, CONTINUE
 925   1347  5465          EXIT                    /YES, EXIT
 926
 927   1375  0130
 928   1376  0125
 929   1377  0052
             1400          PAGE
 930
```



```
 931                 /TEST 24 - NON-PRINTABLE CHARACTER TEST
 932                 /
 933                 /THIS TEST PRINTS A 30 LINE SWIRL PATTERN WITH NON-PRINTABLE CHARACTERS
 934                 /LOADED BEFORE AND AFTER THE PRINTING CHARACTERS TO TEST ALL AREAS OF THE
 935                 /CHARACTER BUFFER IN THE LA180.  IF THIS TEST IS LOOPED ON,
 936                 /THE SWIRL PATTERN WILL CONTINUE, 30 LINES PRINTED
 937                 /EACH TIME THE TEST IS LOOPED.
 938
 939   1400  4462  TEST24, PRTHDR                  /PRINT TEST HEADER
 940   1401  1135          TAD     P41             /SET START CHAR
 941   1402  3031          DCA     CHAR
 942   1403  1167  T24H,   TAD     M36
 943   1404  3036          DCA     LPCNT           /SET LINE COUNT
 944   1405  3040          DCA     PASCNT          /CLEAR CHAR INC COUNT
 945   1406  1026          TAD     WIDTH
 946   1407  1150          TAD     P377            /BUFFER SIZE-COLUMN COUNT
 947   1410  1166  T24A,   TAD     M35             /DIVIDE NON-PRINT CHAR COUNT BY 29
 948   1411  7510          SPA
 949   1412  5215          JMP     T24B
 950   1413  2040          ISZ     PASCNT          /PASCNT=NON-PRINT CHAR INC COUNT
 951   1414  5210          JMP     T24A
 952   1415  7300  T24B,   CLA CLL                 /CLEAR NON-PRINT CHAR COUNT 2ND BLOCK
 953   1416  3035          DCA     COUNT2
 954   1417  1035  T24C,   TAD     COUNT2          /CALCULATE # NON-PRINT CHARS, 1ST BLOCK
 955   1420  7041          CIA
 956   1421  1377          TAD     (-377
 957   1422  1026          TAD     WIDTH
 958   1423  4277          JMS     T24S            /LOAD 1ST BLOCK OF NON-PRINT CHAR
 959   1424  7308          CLA CLL                 /CLEAR AC AND LINK
 960   1425  1026          TAD     WIDTH           /SET # PRINTABLE CHARS (COLUMN COUNT)
 961   1426  3034          DCA     COUNT
 962   1427  1031          TAD     CHAR            /GET FORST PRINT CHAR
 963   1430  3032          DCA     CHAR2
 964   1431  1032  T24D,   TAD     CHAR2           /GET CHAR
 965   1432  4456          LOAD                    /LOAD PRINTABLE CHAR
 966   1433  2034          ISZ     COUNT           /INS CHAR COUNT
 967   1434  7410          SKP                     /NEXT CHAR
 968   1435  5246          JMP     T24E
 969   1436  2032          ISZ     CHAR2
 970   1437  1032          TAD     CHAR2           /CHECK CHAR
 971   1440  1174          TAD     M177            /CHAR=RUBOUT?
 972   1441  7640          SZA CLA
 973   1442  5231          JMP     T24D            /NO, CONTINUE
 974   1443  1134          TAD     P40             /YES, RESET CHAR=SPACE
 975   1444  3032          DCA     CHAR2
 976   1445  5231          JMP     T24D            /CONTINUE
 977   1446  1035  T24E,   TAD     COUNT2          /SET # NON-PRINT CHARS, 2ND BLOCK
 978   1447  4277          JMS     T24S            /LOAD 2ND BLOCK NON-PRINT CHARS
 979   1450  4461          PRINT                   /PRINT LINE
 980   1451  5440          LF
 981   1452  1035          TAD     COUNT2          /IN NON-PRINT CHAR COUNT, 2ND BLOCK
 982   1453  1040          TAD     PASCNT
 983   1454  3035          DCA     COUNT2
 984   1455  2031          ISZ     CHAR            /INC START CHAR
 985   1456  1031          TAD     CHAR            /CHECK START CHAR
```

```
  986   1457  1174          TAD     M177
  987   1460  7640          SZA CLA
  988   1461  5264          JMP     .+3             /OK, CONTINUE
  989   1462  1134          TAD     P40             /RESET START CHAR
  990   1463  3031          DCA     CHAR
  991   1464  2036          ISZ     LPCNT           /INC LINE COUNT
  992   1465  5217          JMP     T24C            /CONTINUE
  993   1466  7300  T24F,   CLA CLL
  994   1467  1052          TAD     TLOOP           /LOOP ON TEST?
  995   1470  7640          SZA CLA
  996   1471  5276          JMP     T24G            /YES, CONTINUE SWIRL
  997   1472  4521          GETSW
  998   1473  0152          AND     P1000           /LOOP ON TEST?
  999   1474  7650          SNA CLA
 1000   1475  5465          EXIT                    /NO, EXIT TEST
 1001   1476  5203  T24G,   JMP     T24H            /LOOP ON TEST
 1002
 1003                       /ROUTINE TO LOAD NON-PRINTABLE CHARACTERS FOR TEST 24
 1004
 1005   1477  0000  T24S,   0
 1006   1500  7550          SPA SNA                 /GOOD CHAR COUNT?
 1007   1501  5677          JMP I   T24S            /NO, RETURN
 1008   1502  7041          CIA                     /YES, NEGATE IT
 1009   1503  3034          DCA     COUNT           /SAVE IT
 1010   1504  3032  T24SC,  DCA     CHAR2           /SET FIRST NON-PRINT CHAR
 1011   1505  1032  T24SA,  TAD     CHAR2           /GET CHAR
 1012   1506  4456          LOAD                    /LOAD CHAR
 1013   1507  2034          ISZ     COUNT           /INC COUNT
 1014   1510  7410          SKP
 1015   1511  5677          JMP I   T24S            /RETURN IF ZERO
 1016   1512  2032  T24SB,  ISZ     CHAR2           /NEXT CHAR
 1017   1513  7300          CLA CLL
 1018   1514  1032          TAD     CHAR2           /CHECK CHAR
 1019   1515  1157          TAD     M7
 1020   1516  7450          SNA
 1021   1517  5312          JMP     T24SB           /BELL, SKIP
 1022   1520  1153          TAD     M1
 1023   1521  7450          SNA
 1024   1522  5312          JMP     T24SB           /SKIP BS
 1025   1523  1154          TAD     M2
 1026   1524  7450          SNA
 1027   1525  5312          JMP     T24SB           /SKIP LF
 1028   1526  1154          TAD     M2
 1029   1527  7450          SNA
 1030   1530  5312          JMP     T24SB           /SKIP FF
 1031   1531  1153          TAD     M1
 1032   1532  7450          SNA
 1033   1533  5312          JMP     T24SB           /SKIP CR
 1034   1534  1163          TAD     M23
 1035   1535  7650          SNA CLA                 /CHAR=SPACE?
 1036   1536  5304          JMP     T24SC           /YES, RESET CHAR
 1037   1537  5305          JMP     T24SA           /NO, CONTINUE
 1038
 1039   1540  0000  SETSKP, 0
 1040   1541  7300          CLA     CLL
```



```
 1041   1542  1021          TAD     PARAM           /GET HARDWARE WORD 1
 1042   1543  7004          RAL                     /PUT OPTION 1 BIT INTO BIT 0
 1043   1544  7710          SPA     CLA             /WAS  OPTION 1 SELECTED  ?
 1044   1545  5351          JMP     .+4             /YES-SETUP IOT TO SKIP ON AND CLEAR DATA  ACCEPTED
 1045   1546  1776'         TAD     RPSKF+3         /NO-SETUP FOR LA180 SKIP ON CHAR IOT
 1046   1547  3775'         DCA     T8MIOT          /SAVE THE SKIP IOT
 1047   1550  5740          JMP  I  SETSKP          /RETURN TO PROGRAM TO LOAD CHAR
 1048   1551  1774'         TAD     OPDBST          /GET OPTION 1 IOT TO SKIP
 1049   1552  5347          JMP     .-3             /RETURN TO PROGRAM
 1050
 1051   1574  2643
 1052   1575  8536
 1053   1576  2637
 1054   1577  7401
               1500          PAGE
 1055
 1056                       /TEST 25 - BUFFER TEST
 1057                       /
 1058                       /THIS TEST CHECKS THE CHARACTER BUFFER OF THE LA180 WHILE PRINTING
 1059                       /FOUR LINES OF NUMBERS (WITH 2 BLANK LINES BETWEEN THE
 1060                       /FIRST AND SECOND LINE).  THESE LINES CAN BE USED TO
 1061                       /CHECK THE PROPER PRINTING WIDTH,
 1062                       /ANY E PRINTED INDICATES AN INCORRECT LOAD OR BUFFER ACTION.
 1063
 1064   1600  4462  TEST25, PRTHDR                   /PRINT TEST HEADER
 1065   1601  1162          TAD     M20             /SET CHAR COUNT
 1066   1602  3034          DCA     COUNT
 1067   1603  1377          TAD     (105            /SET E CHAR
 1068   1604  4460          MLOAD                   /LOAD BUFFER
 1069   1605  1143          TAD     P177            /
 1070   1606  4456          LOAD                    /CLEAR BUFFER
 1071   1607  1026          TAD     WIDTH
 1072   1610  3034          DCA     COUNT           /SET COLUMN COUNT
 1073   1611  1173          TAD     M144
 1074   1612  3036          DCA     LPCNT           /SET ONES COUNT
 1075   1613  7001          IAC                     /SET FIRST CHAR=1
 1076   1614  4345          JMS     T25S            /LOAD ONES
 1077   1615  5230          JMP     T25A            /DONE LINE-PRINT
 1078   1616  1167          TAD     M36
 1079   1617  3036          DCA     LPCNT           /SET THREE'S COUNT
 1080   1620  1376          TAD     (3
 1081   1621  4345          JMS     T25S            /PRINT THREE'S
 1082   1622  5230          JMP     T25A
 1083   1623  1154          TAD     M2
 1084   1624  3036          DCA     LPCNT           /SET TWO'S COUNT
 1085   1625  1126          TAD     P2              /SET CHAR
 1086   1626  4345          JMS     T25S            /PRINT TWO'S
 1087   1627  7000          NOP
 1088   1630  4451  T25A,   PRINT                   /PRINT LINE
 1089   1631  5440          LF
 1090   1632  1375          TAD     (-400           /SET CHAR COUNT
 1091   1633  3034          DCA     COUNT
 1092   1634  1377          TAD     (105            /SET E CHAR
 1093   1635  4460          MLOAD                   /FILL BUFFER
 1094   1636  4461          PRINT                   /PRINT BLANK LINE
```

```
1095    1637  5440            LF
1096    1640  1374            TAD     (-376
1097    1641  3034            DCA     COUNT
1098    1642  1377            TAD     (105
1099    1643  4460            MLOAD                   /LOAD BUFFER E'S
1100    1644  1145            TAD     P177            /CLEAR BUFFER
1101    1645  4456            LOAD                    /CLEAR BUFFER
1102    1646  4461            PRINT
1103    1647  5440            LF                      /PRINT BLANK LINE
1104    1650  1375            TAD     (-400
1105    1651  3034            DCA     COUNT
1106    1652  1377            TAD     (105
1107    1653  4460            MLOAD                   /FILL BUFFER ALL E'S
1108    1654  1026            TAD     WIDTH
1109    1655  3034            DCA     COUNT           /SET COLUMN COUNT
1110    1656  1373            TAD     (-143
1111    1657  3036            DCA     LPCNT           /SET 0'S COUNT=99
1112    1660  4345            JMS     T25S            /LOAD 0'S
1113    1661  5265            JMP     T25B            /PRINT IF DONE LINE
1114    1662  7001            IAC                     /SET 1'S
1115    1663  4345            JMS     T25S            /LOAD 1'S TILL END OF LINE
1116    1664  7000            NOP
1117    1665  4461    T25B,   PRINT                   /PRINT LINE
1118    1666  5440            LF
1119    1667  1372            TAD     (-377
1120    1670  3034            DCA     COUNT
1121    1671  1377            TAD     (105
1122    1672  4460            MLOAD                   /FILL BUFFER WITH E'S
1123    1673  1145            TAD     P177
1124    1674  4456            LOAD                    /CLEAR BUFFER
1125    1675  1026            TAD     WIDTH
1126    1676  3034            DCA     COUNT           /SET COLUMN COUNT
1127    1677  1371            TAD     (-11
1128    1700  3036            DCA     LPCNT           /SET GROUP COUNT
1129    1701  3031    T25C,   DCA     CHAR            /SET CHAR
1130    1702  1031    T25D,   TAD     CHAR            /CHECK CHAR
1131    1703  1160            TAD     M12
1132    1704  7650            SNA CLA
1133    1705  5301            JMP     T25C            /RESET CHAR IF NECESSARY
1134    1706  1031            TAD     CHAR            /GET CHAR
1135    1707  4345            JMS     T25S            /LOAD CHAR
1136    1710  5315            JMP     T25E            /PRINT LINE IF DONE
1137    1711  1160            TAD     M12             /RESET GROUP COUNT
1138    1712  3036            DCA     LPCNT           /SET NEXT CHAR
1139    1713  2031            ISZ     CHAR
1140    1714  5302            JMP     T25D            /CONTINUE
1141    1715  4461    T25E,   PRINT                   /PRINT LINE
1142    1716  5440            LF
1143    1717  1375            TAD     (-400
1144    1720  3034            DCA     COUNT
1145    1721  1377            TAD     (105
1146    1722  4460            MLOAD                   /FILL BUFFER WITH E'S
1147    1723  1370            TAD     (61
1148    1724  3031            DCA     CHAR            /SET FIRST CHAR=1
1149    1725  1026            TAD     WIDTH
```



```
1150    1726  3034            DCA     COUNT           /SET COLUMN COUNT
1151    1727  1031    T25F,   TAD     CHAR            /GET CHAR
1152    1730  4456            LOAD                    /LOAD IT
1153    1731  2031            ISZ     CHAR            /LINE CHAR
1154    1732  1031            TAD     CHAR            /CHECK CHAR
1155    1733  1367            TAD     (-73
1156    1734  7640            SZA CLA
1157    1735  5340            JMP     T25G
1158    1736  1140            TAD     P60
1159    1737  3031            DCA     CHAR            /RESET CHAR TO 0
1160    1740  2034    T25G,   ISZ     COUNT           /INC COLUMN COUNT
1161    1741  5327            JMP     T25F            /FINISH LINE
1162    1742  4461            PRINT                   /PRINT LINE
1163    1743  5440            LF
1164    1744  5465            EXIT                    /EXIT TEST
1165
1166                    /ROUTINE TO LOAD GROUPS OF CHARS FOR TEST 25
1167
1168    1745  0000    T25S,   0
1169    1746  1140            TAD     P60             /MAKE CHAR ASCII
1170    1747  3032            DCA     CHAR2           /SAVE CHAR
1171    1750  1032            TAD     CHAR2           /GET CHAR
1172    1751  4456            LOAD                    /LOAD CHAR
1173    1752  2034            ISZ     COUNT           /INC COLUMN COUNT
1174    1753  7410            SKP                     /CONTINUE
1175    1754  5745            JMP I   T25S            /RETURN, END OF LINE
1176    1755  2036            ISZ     LPCNT
1177    1756  5350            JMP     T25S+3          /CONTINUE
1178    1757  2345            ISZ     T25S            /INC RETURN ADR
1179
1180    1760  5745            JMP I   T25S            /RETURN
1181
1182    1761  7706
1183    1770  0061
1184    1771  7767
1185    1772  7401
1186    1773  7635
1187    1774  7402
1188    1775  7400
1189    1776  0003
1190    1777  0105
              2000              PAGE
1191
1192
1193                    /TEST 26 - OVERPRINT TEST
1194                    /
1195                    /THIS TEST PRINTS FOUR LINES OF ALTERNATING CHARACTERS AND SPACES
1196                    /IN A CHECKERBOARD PATTERN, EACH LINE IS OVERPRINTED TWICE
1197
1198    2000  4462    TST26,  PRTHDR                  /PRINT TEST HEADER
1199    2001  1377            TAD     (T26TAB         /SET TABLE POINTER
1200    2002  3041            DCA     TABPTR
1201    2003  1155    T26A,   TAD     M3              /STROE COUNT FOR 2 OPERPRINTS
1202    2004  3036            DCA     LPCNT
1203    2005  1026    T26B,   TAD     WIDTH           /SET # COLUMNS
```

```
2006  3034          DCA     COUNT
2007  1441  T26C,   TAD I   TABPTR          /GET CHARS
2010  7450          SNA                     /DONE TEST?
2011  5465          EXIT                    /YES, EXIT TEST
2012  0142          AND     P77             /NO, MASK CHAR
2013  1170          TAD     M40             /MAKE ASCII
2014  7510          SPA
2015  1143          TAD     P100
2016  1134          TAD     P40
2017  4456          LOAD                    /LOAD CHAR
2020  2034          ISZ     COUNT           /INC CHAR COUNT
2021  7410          SKP                     /CONTINUE
2022  5237          JMP     T26D            /PRINT LINE
2023  1441          TAD I   TABPTR          /GET CHAR PAIR AGAIN
2024  7012          RTR                     /GET SECOND CHAR
2025  7012          RTR
2026  7012          RTR
2027  0142          AND     P77             /MASK CHAR
2030  1170          TAD     M40             /MAKE ASCII
2031  7510          SPA
2032  1143          TAD     P100
2033  1134          TAD     P40
2034  4456          LOAD                    /LOAD IT
2035  2034          ISZ     COUNT           /INC COUNT
2036  5207          JMP     T26C            /CONTINUE
2037  4461  T26D,   PRINT                   /PRINT LINE
2040  5437          CR
2041  2036          ISZ     LPCNT           /INC OVERPRINT COUNT
2042  5205          JMP     T26B            /CONTINUE
2043  4461          PRINT                   /ADVANCE PAPER
2044  5440          LF
2045  2041          ISZ     TABPTR          /INC TABLE POINTER
2046  5203          JMP     T26A            /GET NEXT PAIR

2047  0540  T26TAB, 0540                    /E-SP
2050  4000          4000                    /SP-0
2051  1540          1540                    /M-SP
2052  4043          4043                    /SP-#
2053  0000          0                       /END OF TABLE

            /TEST 27 - MULTIPLE LINE FEED TEST
            /
            /NUMBER PRINTED INDICATES NUMBER OF LINE FEEDS FOLLOWING THAT LINE.
            /DASHED REFERENCE LINES ARE PRINTED TO AID IN CHECKING PROPER
            /LINE FEEDS.

2054  4462  TEST27, PRTHDR                  /PRINT TEST HEADER
2055  1376          TAD     (T27TAB         /SET TABLE POINTER
2056  3041          DCA     TABPTR
2057  3045  T27A,   DCA     TENS            /CLEAR CONVERSION COUNTERS
2060  3044          DCA     ONES
2061  1441          TAD I   TABPTR          /GET NUMBER
2062  2045          ISZ     TENS            /CONVERT TO ASCII
2063  1160          TAD     M12
2064  7500          SMA
```



```
2065  5262          JMP     .-3
2066  3044          DCA     ONES
2067  7240          CLA CMA
2070  1045          TAD     TENS
2071  7450          SNA                     /SKIP LEADING ZERO'S
2072  5275          JMP     T27B
2073  1140          TAD     P60
2074  4456          LOAD                    /LOAD TENS DIGIT
2075  7300  T27B,   CLA CLL
2076  1044          TAD     ONES
2077  1141          TAD     P72
2100  4456          LOAD                    /LOAD ONES DIGIT
2101  1441          TAD I   TABPTR          /GET #
2102  7450          SNA                     /SKIP IF NOT ZERO
2103  5307          JMP     T27C            /ZERO, PRINT 131 DASHES MAX
2104  1153          TAD     M1
2105  7440          SZA                     /SKIP IF ONE
2106  5315          JMP     T27D
2107  1026  T27C,   TAD     WIDTH           /PRINT 131 DASHES MAX,
2110  1133          TAD     P36             /29 MINIMUM
2111  7740          SMA SZA CLA
2112  5322          JMP     T27DA
2113  1026          TAD     WIDTH
2114  5323          JMP     T27E
2115  1160  T27D,   TAD     M12             /CHECK IF WANT 28 OR 29 DASHES
2116  7700          SMA CLA
2117  5322          JMP     .+3
2120  1166          TAD     M35             /SET 29
2121  7410          SKP
2122  1375  T27DA,  TAD     (-34            /SET 28
2123  3034  T27E,   DCA     COUNT           /STORE DASH COUNT
2124  1136          TAD     P55
2125  4460          HLOAD                   /LOAD DASH LINE
2126  1441          TAD I   TABPTR
2127  7450          SNA
2130  5337          JMP     T27X
2131  7041          CIA
2132  3034          DCA     COUNT
2133  1131          TAD     P12
2134  4460          HLOAD
2135  2041          ISZ     TABPTR
2136  5257          JMP     T27A
2137  4461  T27X,   PRINT                   /PRINT LINE
2140  5440          LF
2141  5465          EXIT                    /EXIT TEST

2142  0001  T27TAB, 1
2143  0002          2
2144  0004          4
2145  0010          10
2146  0020          20
2147  0040          40
2150  0000          0                       /END OF TABLE

2175  7744
```

```
1314    2176  2142
1315    2177  2947
              2200            PAGE
1316
1317
1318
1319
1320
1321
1322                    /TEST 30 = RIBBON FEED TEST
1323                    /
1324                    /THIS TEST PRINTS A SINGLE COLUMN OF 24 LINES OF X'S DOWN THE
1325                    /LEFT HAND MARGIN OF THE PAGE
1326
1327    2200  4462      TEST30, PRTHDR                    /PRINT TEST HEADER
1328    2201  5165              TAD     M30               /SET LINE COUNT
1329    2202  3034              DCA     COUNT
1330    2203  4461      T30A,   PRINT                     /PRINT X-LF
1331    2204  2210              T30M
1332    2205  2034              ISZ     COUNT             /DEC LINE COUNT
1333    2206  5203              JMP     T30A              /FINISH TEST
1334    2207  5465              EXIT                      /EXIT TEST
1335
1336    2210  3073      T30M,   TEXT    /X1/
        2211  0000
1337
1338                    /TEST 31 = BELL TEST
1339                    /
1340                    /THIS TEST WILL SOUND 5 BELLS BETWEEN PRINTING "BELL TEST"
1341
1342    2212  4462      TEST31, PRTHDR                    /PRINT TEST HEADER
1343    2213  1127              TAD     P7
1344    2214  4456              LOAD                      /SEND BELL CODE
1345    2215  4461              PRINT                     /LOAD WORD "BELL"
1346    2216  2240              T31M1
1347    2217  1127              TAD     P7
1348    2220  4456              LOAD                      /LOAD BELL CODE
1349    2221  4461              PRINT                     /LOAD WORD "TEST"
1350    2222  2243              T31M2
1351    2223  1127              TAD     P7
1352    2224  4456              LOAD                      /LOAD
1353    2225  4461              PRINT                     /SEND CR
1354    2226  5437              CR
1355    2227  1127              TAD     P7
1356    2230  4456              LOAD                      /LOAD BELL CODE
1357    2231  4461              PRINT                     /SEND LF
1358    2232  5440              LF
1359    2233  1127              TAD     P7                /LOAD BELL CODE
1360    2234  4456              LOAD
1361    2235  4461              PRINT                     /SEND CR
1362    2236  5437              CR
1363    2237  5465              EXIT                      /EXIT TEST
1364
1365    2240  0285      T31M1,  TEXT    /BELL/
        2241  1414
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        2242  0000
1366    2243  4024      T31M2,  TEXT    / TEST/
        2244  0523
        2245  2400
1367
1368                    /MAINTENANCE AIDS
1369
1370
1371
1372                    /TEST 60 = LIFE TEST
1373                    /
1374                    /THIS TEST PRINTS 2 FULL LINES OF EACH PRINTABLE CHARACTER
1375                    /THE SECOND LINE IS OVERPRINTED 4 TIMES TO CONSERVE PAPER
1376                    /AT THE END OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER
1377                    /SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.
1378
1379    2246  7300      TEST60, CLA CLL                   /CLEAR
1380    2247  3040              DCA     PASCNT            /CLEAR PASS COUNT
1381    2250  4462      T60A,   PRTHDR                    /PRINT TEST HEADER ON BLANK LINES
1382    2251  1135              TAD     P41               /SET FIRST CHAR
1383    2252  3031              DCA     CHAR              /STORE IT
1384    2253  1026      T60B,   TAD     WIDTH             /GET # COLUMNS
1385    2254  3034              DCA     COUNT             /STORE IT
1386    2255  1031              TAD     CHAR              /GET CHAR
1387    2256  4460              MLOAD                     /LOAD LINE
1388    2257  4461              PRINT                     /PRINT LINE
1389    2260  5440              LF
1390    2261  1377              TAD     (-5               /SET OVERPRINT COUNT
1391    2262  3036              DCA     LPCNT
1392    2263  1026      T60C,   TAD     WIDTH             /SET # COLUMNS
1393    2264  3034              DCA     COUNT
1394    2265  1031              TAD     CHAR              /GET CHAR
1395    2266  4460              MLOAD                     /LOAD LINE
1396    2267  4461              PRINT                     /PRINT LINE
1397    2270  5437              CR
1398    2271  2036              ISZ     LPCNT             /INC OVERPRINT COUNT, DONE?
1399    2272  5263              JMP     T60C              /NO, DO AGAIN
1400    2273  4461              PRINT                     /YES, ADVANCE PAPER
1401    2274  5440              LF
1402    2275  2031              ISZ     CHAR              /SET NEXT CHAR
1403    2276  1176              TAD     M177              /CHECK IT
1404    2277  1031              TAD     CHAR
1405    2300  7640              SZA CLA                   /CHAR=RUBOUT?
1406    2301  5253              JMP     T60B              /NO, CONTINUE THIS PASS
1407    2302  2040              ISZ     PASCNT            /YES, INC PASS COUNT
1408    2303  7000              NOP
1409    2304  4461              PRINT                     /PRINT PASS COUNT MESG
1410    2305  5057              PASMSG
1411    2306  3047              DCA     THOUS             /CLEAR CONVERSION COUNTERS
1412    2307  1040              TAD     PASCNT            /GET PASS COUNT & CONVERT TO DECIMAL
1413    2310  2047              ISZ     THOUS
1414    2311  1376              TAD     (-1750
1415    2312  7500              SMA
1416    2313  5310              JMP     .-3
1417    2314  1375              TAD     (1750
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1418    2315  3040            DCA     PASCNT
1419    2316  1137            TAD     P57
1420    2317  1047            TAD     THOUS
1421    2320  4456            LOAD
1422    2321  1040            TAD     PASCNT
1423    2322  4517            JMS I   TCNVRT
1424    2323  4461            PRINT
1425    2324  5435            CNVMSG
1426    2325  4461            PRINT                   /PRINT LINE
1427    2326  5440            LF
1428    2327  5250            JMP     T60A            /CONTINUE TEST
1429
1430    2375  1750
1431    2376  6030
1432    2377  7773
              2400            PAGE
1433
1434                    /TEST 61 - SCOPE DRIVE ROUTINE
1435                    /
1436                    /THIS TEST WILL LOAD A CHARACTER SET IN SW REG BITS 05-11
1437                    /IF SWITCH 04 IS DOWN, FULL LINES WILL BE LOADED & PRINTED
1438                    /A LINEFEED WILL BE INSERTED AUTOMATICALLY IF LOADING PRINTABLE CHARACTERS.
1439                    /IF SWITCH 04 IS UP, THE CHARACTER WILL BE LOADED ONCE & THE
1440                    /PROGRAM WILL HALT; NO LINE FEEDS OF CARRIAGE RETURNS WILL BE SENT BY THE PROGRAM.
1441
1442    2400  4462    TEST61, PRTHDR                  /PRINT HEADER
1443    2401  5225            JMP     T61C            /CHECK SWITCH 4 FIRST
1444    2402  1026    T61A,   TAD     WIDTH           /GET # COLUMNS
1445    2403  3034            DCA     COUNT           /STORE IT
1446    2404  4521    T61B,   GETSW                   /GET SW REG
1447    2405  0145            AND     P177            /MASK CHAR
1448    2406  3031            DCA     CHAR            /SAVE IT
1449    2407  1031            TAD     CHAR            /GET CHAR
1450    2410  4456            LOAD                    /LOAD IT
1451    2411  1160            TAD     M12             /CHECK CHAR
1452    2412  1031            TAD     CHAR
1453    2413  7450            SNA                     /CHAR = LF?
1454    2414  5225            JMP     T61C            /YES, RESET COLUMN COUNT
1455    2415  1155            TAD     M3
1456    2416  7450            SNA                     /CHAR = CR?
1457    2417  5225            JMP     T61C            /YES, RESET COLUMN COUNT
1458    2420  1163            TAD     M23
1459    2421  7700            SMA CLA                 /NON-PRINTABLE CHAR?
1460    2422  2034            ISZ     COUNT           /NO, INC COLUMN COUNT
1461    2423  7000            NOP
1462    2424  5230            JMP     T61D            /CHECK SW 04
1463    2425  7300    T61C,   CLA CLL                 /CLEAR
1464    2426  1026            TAD     WIDTH           /GET # COLUMNS
1465    2427  3034            DCA     COUNT           /STORE IT
1466    2430  7604    T61D,   LAS                     /GET SW REG
1467    2431  0146            AND     P200            /MASK SW 04
1468    2432  7650            SNA CLA                 /SWITCH 4 UP?
1469    2433  5236            JMP     T61E            /NO, CONTINUE
1470    2434  7402            HLT                     /YES, HALT
1471    2435  5204            JMP     T61B            /GET NEXT CHAR


/MAINDEC-08-DILAC-B-L  PAL10  V142A  20-DEC-76  9116  PAGE 1-27

1472    2436  1034    T61E,   TAD     COUNT           /GET COLUMN COUNT
1473    2437  7510            SPA                     /DONE LOAD?
1474    2440  5204            JMP     T61B            /NO, CONTINUE
1475    2441  7650            SNA CLA                 /TOO MANY LOADED?
1476    2442  5245            JMP     T61F            /NO, CONTINUE
1477    2443  1145            TAD     P177            /YES, SET RUBOUT
1478    2444  4456            LOAD                    /CLEAR BUFFER
1479    2445  4461    T61F,   PRINT                   /PRINT LOADED CHARACTERS
1480    2446  5440            LF
1481    2447  5202            JMP     T61A            /CONTINUE TEST
1482
1483                    /TEST 62 - LINE PRINT TEST
1484                    /
1485                    /THIS TEST PRINTS FULL LINES CONTINUOUSLY OF WHATEVER CHARACTER
1486                    /IS TYPED ON THE CONSOLE KEYBOARD.  TO CHANGE CHARACTERS,
1487                    /RESELECT THIS TEST.  AN ERROR MESSAGE WILL BE PRINTED
1488                    /IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST.
1489
1490    2450  4462    TEST62, PRTHDR                  /PRINT TEST HEADER
1491    2451  1053            TAD     TPFLG           /CHECK IF TERM EXISTS
1492    2452  7650            SNA CLA
1493    2453  5341            JMP     TERR            /EXIT IF NONE
1494    2454  4455            TYPE                    /TYPE INSTR
1495    2455  5244            TCHAR
1496    2456  4472            JMS I   TKSF            /WAIT FOR KYBD FLAG
1497    2457  5256            JMP     .-1
1498    2460  4464            CHECK                   /CHECK CHAR FOR CONTROL
1499    2461  4475            JMS I   TKRB            /READ CHAR
1500    2462  4501    T62A,   JMS I   TTLS            /ECHO CHAR
1501    2463  4476            JMS I   TTSF
1502    2464  5263            JMP     .-1
1503    2465  3031            DCA     CHAR            /SAVE CHAR
1504    2466  4455            TYPE                    /SEND CR-LF
1505    2467  5441            CRLF
1506    2470  1026    T62B,   TAD     WIDTH           /SET COLUMN COUNT
1507    2471  3034            DCA     COUNT
1508    2472  1031            TAD     CHAR            /GET CHAR
1509    2473  4460            MLOAD                   /LOAD LINE
1510    2474  4461            PRINT
1511    2475  5440            LF                      /PRINT LINE
1512    2476  5270            JMP     T62B            /CONTINUE
1513
1514                    /TEST 63 - CHARACTER PRINT TEST
1515                    /
1516                    /THIS TEST LOADS WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD
1517                    /TO THE LA180, CHARACTER BY CHARACTER.
1518                    /IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST,
1519                    /AN ERROR MESG WILL BE PRINTED.
1520
1521    2477  4462    TEST63, PRTHDR                  /PRINT TEST HEADER
1522    2500  1053            TAD     TPFLG           /CHECK IF TERM EXISTS
1523    2501  7650            SNA CLA
1524    2502  5341            JMP     TERR            /EXIT IF NONE
1525    2503  4455            TYPE                    /TYPE INSTR
1526    2504  5244            TCHAR
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1527  2505  4455          TYPE                    /SEND CR-LF
1528  2506  5441          CRLF
1529  2507  4472  T63B,   JMS I   TKSF            /WAIT FOR KYBD FLAG
1530  2510  5307          JMP     .-1
                          CHECK                   /CHECK CHAR FOR CONTROL
1531  2511  4464          JMS I   TKRB            /READ CHAR
1532  2512  4475          AND     P177            /MASK BIT 8
1533  2513  0145          DCA     CHAR
1534  2514  3031          TAD     CHAR
1535  2515  1031          TAD     CHAR            /ECHO CHAR
1536  2516  4501  T63A,   JMS I   TTLS
1537  2517  4476          JMS I   TTSF
1538  2520  5317          JMP     .-1
1539  2521  4456          LOAD                    /LOAD CHAR
1540  2522  1031          TAD     CHAR            /CR-LF AFTER CR
1541  2523  1161          TAD     M15
1542  2524  7650          SNA CLA
1543  2525  5336          JMP     T63E
1544  2526  1031  T63C,   TAD     CHAR            /CR-LF AFTER LF
1545  2527  1160          TAD     M12
1546  2530  7650          SNA CLA
1547  2531  5336          JMP     T63E
1548  2532  1031  T63D,   TAD     CHAR            /CR-LF AFTER FF
1549  2533  1377          TAD     (-14
1550  2534  7640          SZA CLA
1551  2535  5307          JMP     T63B
1552  2536  4455  T63E,   TYPE
1553  2537  5441          CRLF
1554  2540  5307          JMP     T63B
1555
1556  2541  4461  TERR,   PRINT                   /PRINT ERROR MESG ON LA180
1557  2542  5233          NOMSG
1558  2543  5465          EXIT                    /EXIT TEST
1559  2577  7764          PAGE
              2600
1560
1561                      /TTY I-O INSTRUCTIONS
1562
1563  2600  0000  RKSF,   0
1564  2601  6031          KSF                     /SKIP IF FLAG IS SET
1565  2602  7410          SKP
1566  2603  2200          ISZ     RKSF            /INC RETURN ADR
1567  2604  5600          JMP I   RKSF            /RETURN
1568
1569  2605  0000  RKCC,   0
1570  2606  6032          KCC                     /CLEAR FLAG
1571  2607  5605          JMP I   RKCC            /RETURN
1572
1573  2610  0000  RKRS,   0
1574  2611  6034          KRS                     /READ BUFFER (STATIC)
1575  2612  5610          JMP I   RKRS            /RETURN
1576
1577  2613  0000  RKRB,   0
1578  2614  6036          KRB                     /CLEAR AC, READ BUFFER & CLEAR FLAG
1579  2615  5613          JMP I   RKRB            /RETURN
1580
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1581  2616  0000  RTSF,   0
1582  2617  6041          TSF                     /SKIP IF FLAG IS SET
1583  2620  7410          SKP
1584  2621  2216          ISZ     RTSF            /INC RETURN ADR
1585  2622  5616          JMP I   RTSF            /RETURN
1586
1587  2623  0000  RTCF,   0
1588  2624  6042          TCF                     /CLEAR FLAG
1589  2625  5623          JMP I   RTCF            /RETURN
1590
1591  2626  0000  RTPC,   0
1592  2627  6044          TPC                     /LOAD BUFFER
1593  2630  5626          JMP I   RTPC            /RETURN
1594
1595  2631  0000  RTLS,   0
1596  2632  6046          TLS                     /PRINT CHAR
1597  2633  5631          JMP I   RTLS            /RETURN
1598                      /PRINTER INSTRUCTIONS
1599
1600  2634  0000  RPSKF,  0
1601  2635  4777* 
1602  2636  2643          JMS     OP1CHK          /GO CHECK TO SEE IF RUNNING ON PAR I/O
1603  2637  6661          OPDBST                  /ON PARALLEL I/O
1604  2640  7410          PSKF                    /SKIP ON CHARACTER FLAG
1605  2641  2234          SKP
1606  2642  5634          ISZ     RPSKF           /INCREMENT RETURN ADDRESS FOR SKIP
1607  2643  6570  OPDBST, DBST    I   RPSKF       /RETURN
1608  2644  5634          JMP     I   RPSKF       /SKIP ON DATA ACCEPTED AND CLEAR IT
1609  2645  5241          JMP     .-4             /FLAG NOT SET RETURN
                                                  /BUMP RETURN AND THEN RETURN
1610
1611  2646  0000  RPCLF,  0
1612  2647  4777* 
1613  2650  2653          JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
1614  2651  6662          OP1CLF                  /ADDRESS FOR PARALLEL I/O ROUTINE
1615  2652  5646          PCLF                    /CLEAR CHARACTER FLAG
1616  2653  6570  OP1CLF, JMP     I   RPCLF       /RETURN
1617  2654  5646          DBST                    /SKIP ON DATA ACCEPTED AND CLEAR IT
1618  2655  5646          JMP     I   RPCLF       /RETURN FLAG WAS NOT SET
                          JMP     I   RPCLF       /RETURN FLAG IS NOW A ZERO
1619
1620  2656  0000  RPSTB,  0
1621  2657  4777* 
1622  2660  2663          JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
1623  2661  6664          OPLOD1                  /ADDRESS FOR PARALLEL I/O ROUTINE
1624  2662  5656          PSTB                    /LOAD BUFFER
1625  2663  7040  OPLOD1, JMP     I   RPSTB       /RETURN TO PROGRAM
1626  2664  6574          CMA                     /NEGATE THE WORD FOR PARALLEL I/O
1627  2665  7040          DBTO                    /LOAD THE 12 BIT PARALLEL I/O
1628  2666  6577          CMA                     /RESET THE WORD TO ORIGINAL WORD
1629  2667  5656          DBSS                    /ISSUE A DATA STROBE PULSE
                          JMP     I   RPSTB       /RETURN TO PROGRAM
1630
1631  2670  0000  RPSIE,  0
1632  2671  4777* 
1633  2672  2675          JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
1634  2673  6665          OPSCIE                  /ADDRESS FOR PARALLEL I/O ROUTINE
1635  2674  5670          PSIE                    /ENABLE INTERRUPTS
                          JMP     I   RPSIE       /RETURN
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1636    2675  7440    OP8CIE, SPA                     /CHECK DATA BIT 11
1637    2676  6575            DPSE                    /SET DATA BIT 11
1638    2677  7450            SNA
1639    2700  6576            DRCE                    /CLEAR PARALLEL I/O INT ENA
1640    2701  5670            JMP  I  RPSIE           /RETURN TO THE PROGRAM
1641
1642    2702  0000    RPCLP,  0
1643    2703  4777'           JMS     OP1CHK          /GO CHECK FOR PARALLEL I/O
1644    2704  2707            OPLOD2                  /ADDRESS FOR PARALLEL I/O ROUTINE
1645    2705  6666            PCLP                    /CLEAR FLAG AND LOAD BUFFER
1646    2706  5702            JMP  I  RPCLP           /RETURN TO THE PROGRAM
1647    2707  6570    OPLOD2, DBST                    /SKIP ON DATA ACCEPTED AND CLEAR IT
1648    2710  7000            NOP                     /USED INCASE FLAG WAS SET
1649    2711  7040            CMA                     /NEGATE THE WORD TO LOAD FOR PAR I/O
1650    2712  6574            DBTO                    /LOAD THE PARALLEL I/O BUFFER
1651    2713  7040            CMA                     /RESET THE WORD BACK TO ORIGINAL WORD
1652    2714  6577            DBSS                    /ISSUE A DATA STROBE
1653    2715  5702            JMP  I  RPCLP           /RETURN BACK TO PROGRAM
1654
1655                    /ROUTINE TO MODIFY I-O INSTRUCTIONS FOR SELECTED IOT CODES
1656                    /ON CONSOLE TERMINAL & LA180 PRINTER
1657
1658    2716  0000    MIOT,   0
1659    2717  7300            CLA CLL                 /CLEAR
1660    2720  1156            TAD     M4              /SET LOOP COUNT
1661    2721  3034            DCA     COUNT
1662    2722  1376            TAD     (IOTAB-1        /SET TABLE POINTER
1663    2723  3010            DCA     AUTPTR
1664    2724  1030            TAD     IOTSEL          /GET IOT SELECTION
1665    2725  0172            AND     M100            /MASK XMIT IOT
1666    2726  7110            CLL RAR
1667    2727  7112            CLL RTR
1668    2730  3033    MIOTB,  DCA     SAVE            /STORE IOT
1669    2731  1410    MIOTA,  TAD I   AUTPTR          /GET TABLE ENTRY
1670    2732  7450            SNA                     /DONE TTY IOT'S?
1671    2733  5350            JMP     MIOTC           /YES, DO PRINTER
1672    2734  3041            DCA     TABPTR          /NO, STORE INSTR ADR
1673    2735  1441            TAD I   TABPTR          /GET INSTR
1674    2736  0375            AND     (7007           /MASK INSTR CODE
1675    2737  1033            TAD     SAVE            /ADD IOT
1676    2740  3441            DCA I   TABPTR          /STORE NEW IO INSTR
1677    2741  2034            ISZ     COUNT           /INC COUNT
1678    2742  5331            JMP     MIOTA           /CONTINUE THIS IOT
1679    2743  1030            TAD     IOTSEL          /GET IOT SELECTION
1680    2744  0142            AND     P77             /MASK RCVR IOT
1681    2745  7106            CLL RTL
1682    2746  7104            CLL RAL
1683    2747  5330            JMP     MIOTB           /CONTINUE
1684    2750  1410    MIOTC,  TAD I   AUTPTR          /GET TABLE ENTRY
1685    2751  7450            SNA                     /DONE?
1686    2752  5716            JMP I   MIOT            /YES, RETURN
1687    2753  3041            DCA     TABPTR          /NO, STORE INSTR ADR
1688    2754  1441            TAD I   TABPTR          /GET INSTR
1689    2755  0375            AND     (7007           /MASK INSTR CODE
1690    2756  1027            TAD     PTRIOT          /ADD IOT
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1691    2757  3441            DCA I   TABPTR          /STORE NEW INSTR
1692    2760  5350            JMP     MIOTC           /CONTINUE
1693
1694    2775  7007
1695    2776  4534
1696    2777  3142
              3000            PAGE
1697
1698
1699                    /CLOCK INTERRUPT SERVICE ROUTINE FOR TEST 2
1700
1701    3000  6133    CKSRV,  CLSK                    /SKIP ON CLOCK FLAG
1702    3001  5213            JMP     CKEXIT          /RETURN IF NOT CLOCK INTERRUPT
1703    3002  2037            ISZ     CKCNT           /INC CLOCK COUNT
1704    3003  5213            JMP     CKEXIT          /RETURN IF COUNT IS NOT ZERO
1705    3004  2036            ISZ     LPCNT           /INC TIME COUNT
1706    3005  7410            SKP                     /CONTINUE IF NOT ZERO
1707    3006  5615            JMP I   CKSTOP          /END OF TIME - PRINT TIMING MESG
1708    3007  3216            DCA     ISAVE           /SAVE AC
1709    3010  1054            TAD     CKFLAG          /RESET CLOCK COUNT
1710    3011  3037            DCA     CKCNT
1711    3012  1216            TAD     ISAVE           /RESTORE AC
1712    3013  6001    CKEXIT, ION                     /INTERRUPT SYSTEM ON
1713    3014  5400            JMP I   0000            /RETURN TO TEST
1714
1715    3015  1116    CKSTOP, T2SPDC                  /RETURN ADR - PRINT TIMING MESG
1716    3016  0000    ISAVE,  0                       /SAVE AC
1717
1718                    /TEST EXIT ROUTINE
1719
1720    3017  4507    REXIT,  JMS I   TKBFG           /CHECK FOR KYBD FLAG
1721    3020  4521            GETSW                   /GET SW REG
1722    3021  0152            AND     P1000           /MASK SW2
1723    3022  7640            SZA CLA                 /LOOP ON TEST?
1724    3023  5237            JMP     EXIT3           /YES, RETURN TO TEST
1725    3024  4521            GETSW                   /GET SW REG
1726    3025  0151            AND     P400            /MASK SW3
1727    3026  7640            SZA CLA                 /WANT SW REG CONTROL?
1728    3027  5467            JMP I   TSELCT          /YES, SELECT TEST HALT
1729    3030  1052            TAD     TLOOP           /KYBD CNTRL - LOOP ON TEST?
1730    3031  7640            SZA CLA
1731    3032  5237            JMP     EXIT3           /YES, RETURN TO TEST
1732    3033  1051            TAD     TRONE           /KYBD CNTRL - RUN TEST ONCE?
1733    3034  7640            SZA CLA
1734    3035  5510            JMP I   TTSEL          /YES, SELECT TEST
1735    3036  2023    EXIT1,  ISZ     TSTNM           /INC TEST NUMBER
1736    3037  1070    EXIT3,  TAD     TTAT            /GET TABLE ADR
1737    3040  1023            TAD     TSTNM           /ADD TEST NUMBER
1738    3041  3041            DCA     TABPTR          /STORE POINTER
1739    3042  1441            TAD I   TABPTR          /GET TEST ADR
1740    3043  7558            SNA SPA                 /SKIP IF OK
1741    3044  5247            JMP     EXIT2           /CHECK IF NOT OK
1742    3045  3042            DCA     TSTPTR          /STORE ADR
1743    3046  5442            JMP I   TSTPTR          /GO TO TEST
1744    3047  7700    EXIT2,  SMA CLA                 /-1 IN TABLE?
```

```
1745  3050  5236          JMP     EXIT1           /NO, INC TEST #
1746  3051  1377          TAD     (20             /RESTART PRINTING TEST SEQUENCE
1747  3052  3023          DCA     TSTNM
1748  3053  5237          JMP     .EXIT3
1749
1750                      /SELECT TEST FROM CPU SW REG BITS 06-11
1751
1752  3054  6002  SELECT, IOF                     /DISABLE INTERRUPTS
1753  3055  6132          CLDI
1754  3056  7300          CLA CLL
1755  3057  4585          JMS I   TPSIE
1756  3060  3050          DCA     .STRONE         /CLEAR CONTROL FLAGS
1757  3061  3051          DCA     TRONE
1758  3062  3052          DCA     TLOOP
1759  3063  1125          TAD     LIERR           /RESET INTERRUPT ERROR
1760  3064  3002          DCA     ISRV
1761  3065  4587          JMS I   TKBFG           /CHECK IF KYBD FLAG
1762  3066  7402          HLT                     /WAIT FOR OPERATOR TO SELECT TEST
1763                                              /PRESS CONTINUE WHEN READY
1764  3067  4521          GETSW                   /GET SW REG
1765  3070  0151          AND     P400            /MASK SW9
1766  3071  7640          SZA CLA                 /WANT TO RUN TEST ONCE & HALT?
1767  3072  7040          CMA                     /YES, SET FLAG
1768  3073  3050          DCA     STRONE          /STORE FLAG
1769  3074  4521          GETSW                   /GET SW REG
1770  3075  0142          AND     P77             /SAVE TEST #
1771  3076  3023          DCA     TSTNM           /STORE TEST #
1772  3077  1070          TAD     TTAT            /GET TABLE ADDRESS
1773  3100  1023          TAD     TSTNM           /ADD TEST NUMBER
1774  3101  3041          DCA     TABPTR          /STORE POINTER
1775  3102  1441          TAD I   TABPTR          /GET TEST ADR
1776  3103  7550          SNA SPA                 /CHECK IT = OK?
1777  3104  5254          JMP     SELECT          /NO, GET NEW SELECTION
1778  3105  3042          DCA     TSTPTR          /OK, STORE ADR
1779  3106  5442          JMP I   TSTPTR          /GO TO TEST
1780
1781                      /ROUTINE TO CHECK FOR KYBD OR SW REG CONTROL
1782                      /CALL:  CHECK = JMS I    TCHECK
1783
1784  3107  0000  RCHECK, 0
1785  3110  3033          DCA     SAVE            /SAVE AC
1786  3111  4587          JMS I   TKBFG           /CHECK FOR KYBD FLAG
1787  3112  4521          GETSW                   /GET SW REG
1788  3113  0151          AND     P400            /MASK SW9
1789  3114  7640          SZA CLA                 /SW9 UP?
1790  3115  7001          IAC                     /YES, SET AC = +1
1791  3116  1050          TAD     STRONE          /ADD ONE RUN FLAG
1792  3117  7640          SZA CLA                 /CHANGE IN SWITCH SETTING?
1793  3120  5467          JMP I   TSELCT          /YES, SELECT TEST
1794  3121  1033          TAD     SAVE            /RESTORE AC
1795  3122  5707          JMP I   RCHECK          /NO, RETURN
1796
1797
1798                      /ROUTINE TO WAIT FOR OPERATOR ACTION
1799
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1800  3123  0000  RHOLD,  0
1801  3124  3341          DCA     HOLDCH          /SAVE AC
1802  3125  1053          TAD     TPFLG           /TERMINAL THERE?
1803  3126  7650          SNA CLA                 /BRANCH IF YES
1804  3127  5336          JMP     RHOLDA          /HALT IF NO TERMINAL
1805  3130  4455          TYPE                    /TYPE WAIT MESG
1806  3131  4777          WTMSG
1807  3132  1341          TAD     HOLDCH          /RESTORE AC
1808  3133  4472          JMS I   TKSF            /WAIT FOR KYBD FLAG
1809  3134  5333          JMP     .-1
1810  3135  5723          JMP I   RHOLD           /RETURN
1811  3136  1341  RHOLDA, TAD     HOLDCH          /RESTORE AC
1812  3137  7402          HLT                     /HALT
1813  3140  5723          JMP I   RHOLD           /RETURN
1814
1815  3141  0000  HOLDCH, 0                      /SAVE AC
1816
1817                      /ROUTINE TO CHECK FOR PARALLEL I/O
1818
1819  3142  0000  OP1CHK, 0
1820  3143  3356          DCA     SAVEAC          /SAVE THE ENTERING AC
1821  3144  1021          TAD     PARAM           /GET HARDWARE WORD 1
1822  3145  7004          RAL                     /PUT OPTION 1 BIT INTO BIT 0
1823  3146  7710          SPA     CLA             /IS LA180 RUNNING ON PARALLEL I/O
1824  3147  5353          JMP     .+4             /YES-GO GET ADDRESS FOR PARALLEL I/O
1825  3150  2342          ISZ     OP1CHK          /BUMP RETURN POINTER
1826  3151  1356          TAD     SAVEAC          /RESTORE THE AC
1827  3152  5742          JMP  I  OP1CHK          /RETURN TO  IOT SUBROUTINE
1828  3153  1742          TAD  I  OP1CHK          /GET ADDRESS OF PARALLEL I/O
1829  3154  3342          DCA     OP1CHK          /SAVE IT FOR RETURN
1830  3155  5351          JMP     .-4             /RETURN TO EXECUTE PARALLEL I/O CODE
1831
1832  3156  0000  SAVEAC, 0
1833
1834  3177  0020
              3200          PAGE
1835
1836                      /ROUTINE TO CHECK FOR KYBD FLAG
1837                      /WHEN LOOKING FOR CONTROL FROM THE CONSOLE DEVICE KEYBOARD
1838                      /ALSO CHECKS FOR DYNAMIC SOFTWARE SWITCH REGISTER CONTROL WHEN
1839                      /USING SOFTWARE SWITCHES
1840
1841  3200  0000  KYBDF,  0
1842  3201  7300          CLA CLL                 /CLEAR
1843  3202  1053          TAD     TPFLG           /GET TERMINAL FLAG
1844  3203  7650          SNA CLA                 /TERMINAL THERE?
1845  3204  5600          JMP I   KYBDF           /NO, RETURN
1846  3205  4472          JMS I   TKSF            /KYBD FLAG SET?
1847  3206  5600          JMP I   KYBDF           /NO, RETURN
1848  3207  4475          JMS I   TKRB            /YES, READ CHAR
1849  3210  0145          AND     P177            /MASK BIT 8
1850  3211  3324          DCA     KYBDC           /SAVE CHAR
1851  3212  1021          TAD     PARAM           /USING SOFTWARE SWITCH REG?
1852  3213  7710          SPA CLA
1853  3214  5313          JMP     KFA             /NO, CONTINUE
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1854  3215  1324          TAD     KYBDC           /YES, GET CHAR
1855  3216  1157          TAD     M7              /CHAR = BEL <007> ?
1856  3217  7640          SZA CLA
1857  3220  5313          JMP     KFA             /NO, CHECK CHAR AGAIN FOR OTHER CONTROLS
1858  3221  7300  KFB,    CLA CLL                 /CLEAR AC AND LINK
1859  3222  3325          DCA     TTYIN           /CLEAR NEW SWITCH SETTINGS
1860  3223  3326          DCA     INFLAG          /CLEAR INPUT FLAG
1861  3224  4455          TYPE                    /TYPE MESG
1862  3225  4766          DSWSG1
1863  3226  1020          TAD     SWITCH          /GET CURRENT SOFTWARE SWITCH SETTING
1864  3227  4523          JMS I   TPOCT           /TYPE IT
1865  3230  4455          TYPE                    /TYPE REST OF MESG
1866  3231  4772          DSWSG2
1867  3232  4472  KFF,    JMS I   TKSF            /KYBD FLAG?
1868  3233  5232          JMP     .-1             /NO, WAIT
1869  3234  4475          JMS I   TKRB            /YES, READ CHAR
1870  3235  0145          AND     P177            /MASK CHAR = MAKE 7-BIT ASCII
1871  3236  3324          DCA     KYBDC           /SAVE CHAR
1872  3237  1164          TAD     M25             /CHECK CHAR
1873  3240  1324          TAD     KYBDC
1874  3241  7640          SZA CLA                 /CHAR = CONTROL-U
1875  3242  5246          JMP     KFC             /NO, CHECK AGAIN
1876  3243  4455          TYPE                    /YES, TYPE CONTROL-U, CR-LF
1877  3244  5445          CNTLU
1878  3245  5221          JMP     KFB             /RESTART ROUTINE
1879  3246  1161  KFC,    TAD     M15             /CHECK IF CHAR = CR?
1880  3247  1324          TAD     KYBDC
1881  3250  7640          SZA CLA                 /CHAR = CR?
1882  3251  5262          JMP     KFD             /NO, CHECK AGAIN
1883  3252  4455          TYPE                    /YES, ECHO CR-LF
1884  3253  5441          CRLF
1885  3254  1326          TAD     INFLAG          /CHECK INPUT FLAG
1886  3255  7650          SNA CLA
1887  3256  5600          JMP I   KYBDF           /LEAVE SW SETTINGS ALONE IF NO INPUT
1888  3257  1325          TAD     TTYIN           /SET NEW SWITCH SETTINGS
1889  3260  3020          DCA     SWITCH
1890  3261  5680          JMP I   KYBDF           /RETURN TO TEST
1891  3262  1160  KFD,    TAD     M12             /CHECK IF CHAR = LF
1892  3263  1324          TAD     KYBDC
1893  3264  7640          SZA CLA
1894  3265  5274          JMP     KFE             /NO, CHECK AGAIN
1895  3266  4455          TYPE                    /YES, ECHO CR-LF
1896  3267  5441          CRLF
1897  3270  1326          TAD     INFLAG          /CHECK INPUT FLAG
1898  3271  7650          SNA CLA
1899  3272  5510          JMP I   TTSEL           /LEAVE SW SETTINGS ALONE IF NO INPUT
1900  3273  1325          TAD     TTYIN           /SET NEW SWITCH SETTINGS
1901  3274  3020          DCA     SWITCH
1902  3275  5510          JMP I   TTSEL           /SELECT TEST
1903  3276  1324  KFE,    TAD     KYBDC           /GET CHAR
1904  3277  4522          JMS I   PDIGIT          /PRINT OCTAL DIGIT ALWAYS AS BEING STORED
1905  3300  1324          TAD     KYBDC           /GET CHAR AGAIN
1906  3301  0127          AND     P7              /MASK OCTAL DIGIT FROM ASCII CODE
1907  3302  3324          DCA     KYBDC           /SAVE IT
1908  3303  1325          TAD     TTYIN           /GET CURRENT SWITCH SETTING
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1909  3304  7104          CLL RAL                 /ROTATE SWITCH SETTINGS TO ADD NEW ONE
1910  3305  7104          CLL RAL
1911  3306  7104          CLL RAL
1912  3307  1324          TAD     KYBDC           /ADD NEW SWITCHES
1913  3310  3325          DCA     TTYIN           /SAVE NEW SETTING
1914  3311  2326          ISZ     INFLAG          /SET INPUT FLAG
1915  3312  5232          JMP     KFF             /CONTINUE
1916  3313  1324  KFA,    TAD     KYBDC           /GET CHAR AGAIN
1917  3314  1174          TAD     N177            /CHAR = RUBOUT?
1918  3315  7650          SNA CLA
1919  3316  5510          JMP I   TTSEL           /YES, GET TEST SELECTION
1920  3317  1324          TAD     KYBDC           /NO, GET CHAR AGAIN
1921  3320  1155          TAD     N3              /CHAR = CNTL C ?
1922  3321  7650          SNA CLA
1923  3322  5466          JMP I   TKBDST          /YES, GET # COLUMNS
1924  3323  5600          JMP I   KYBDF           /NO, RETURN
1925
1926  3324  0000  KYBDC,  0                       /INPUT CHAR
1927  3325  0000  TTYIN,  0                       /SOFTWARE SWITCH INPUT
1928  3326  0000  INFLAG, 0                       /INPUT FLAG
1929        3400          PAGE
1930
1931
1932  3400  4451  KBTAB,  READQ                   /INPUT ERROR
1933  3401  3422          KYBDAA                  /3 DIGIT # INPUT
1934  3402  3433          KYBDA                   /2 DIGIT # INPUT
1935  3403  3447          KYBDB                   /1 DIGIT # INPUT
1936  3404  4451          READQ                   /INPUT ERROR
1937
1938                      /ROUTINE TO SET NUMBER OF COLUMNS FROM CONSOLE DEVICE KYBD
1939                      /WILL ALLOW 1 TO 3 DIGIT INPUT, NO LEADING ZEROS NEEDED.
1940
1941  3405  4455  KYBDST, TYPE                    /TYPE COLUMNS MESG
1942  3406  4746          COLUMN
1943  3407  3026          DCA     WIDTH           /CLEAR COLUMN COUNT
1944  3410  4511          JMS I   READ            /READ # COLUMNS
1945  3411  1377          TAD     (READT-1        /GET TABLE ADR
1946  3412  3010          DCA     AUTPTR          /SET TABLE POINTER
1947  3413  1034          TAD     COUNT           /GET CHAR COUNT FROM INPUT ROUTINE
1948  3414  7041          CIA                     /MAKE IT POSITIVE
1949  3415  1376          TAD     (KBTAB          /ADD TABLE STARTING ADR
1950  3416  3033          DCA     SAVE            /SAVE TABLE ENTRY ADR
1951  3417  1433          TAD I   SAVE            /GET TABLE ENTRY
1952  3420  3033          DCA     SAVE            /SAVE ADR FOR CONVERSION ROUTINE
1953  3421  5433          JMP I   SAVE            /CONVERT INPUT NUMBER TO BINARY (OCTAL)
1954  3422  1410  KYBDAA, TAD I   AUTPTR          /GET CHAR
1955  3423  4514          JMS I   CHKNR           /CHECK IF NUMBER & MAKE OCTAL
1956  3424  7450          SNA                     /ZERO?
1957  3425  5213          JMP     KYBDA           /YES, CONTINUE
1958  3426  7041          CIA                     /NEGATE #
1959  3427  3034          DCA     COUNT           /STORE IN COUNT
1960  3430  1173          TAD     N144            /CONVERT TO BINARY
1961  3431  2034          ISZ     COUNT
1962  3432  5230          JMP     .-2
1963  3433  3026  KYBDA,  DCA     WIDTH           /STORE #
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1964  3434  1410          TAD I   AUTPTR          /GET NEXT DIGIT
1965  3435  4514          JMS I   CHKNR           /CHECK IF #
1966  3436  7450          SNA                     /ZERO?
1967  3437  5247          JMP     KYBDB           /YES, CONTINUE
1968  3440  7041          CIA                     /NEGATE #
1969  3441  3034          DCA     COUNT           /STORE IN COUNT
1970  3442  1160          TAD     M12             /CONVERT TO BINARY
1971  3443  2034          ISZ     COUNT
1972  3444  5242          JMP     .-2
1973  3445  1026          TAD     WIDTH           /ADD TO CURRENT TOTAL
1974  3446  3026          DCA     WIDTH           /STORE NEW #
1975  3447  1410  KYBDB,  TAD I   AUTPTR          /GET LAST DIGIT
1976  3450  4514          JMS I   CHKNR           /CHECK IF #
1977  3451  7041          CIA                     /NEGATE IT
1978  3452  1026          TAD     WIDTH           /ADD TO CURRENT TOTAL
1979  3453  3026          DCA     WIDTH           /STORE WIDTH
1980  3454  1126          TAD     P2              /CHECK COLUMN SELECTION
1981  3455  1026          TAD     WIDTH
1982  3456  7740          SNA SZA CLA             /0 COLUMNS <2?
1983  3457  5512          JMP I   TREADQ          /YES, INPUT ERROR
1984  3460  1147          TAD     P204
1985  3461  1026          TAD     WIDTH
1986  3462  7710          SPA CLA                 /0 COLUMNS >132 (120)?
1987  3463  5512          JMP I   TREADQ          /YES, INPUT ERROR
1988  3464  5510          JMP I   TTSEL           /NO, GO TO TEST SELECT
1989
1990                      /ROUTINE TO SELECT TEST FROM CONSOLE DEVICE KYBD
1991                      /AND DETERMINE TEST ACTION BY INPUT CONTROL CHAR
1992                      /TEST NUMBER MUST BE A 3 DIGIT OCTAL NUMBER, FOLLOWED
1993                      /BY ONE OF THE CONTROL CHARACTERS BELOW:
1994
1995                      /PERIOD .       = RUN TEST ONCE & SELECT NEXT TEST
1996                      /L              = LOOP ON SELECTED TEST
1997                      /S              = START TEST SEQUENCE WITH SELECTED TEST
1998
1999  3465  6002  TSEL,   IOF                     /DISABLE INTERRUPTS
2000  3466  6133          CLDI
2001  3467  7300          CLA CLL
2002  3470  4595          JMS I   TPSIE
2003  3471  3051          DCA     TRONE           /CLEAR PROGRAM CONTROL FLAGS
2004  3472  3052          DCA     TLOOP
2005  3473  3058          DCA     STRONE
2006  3474  1125          TAD     LIERR           /SET INTERRUPT ERROR ADR
2007  3475  3002          DCA     ISRV
2008  3476  4455          TYPE                    /TYPE SELECT TEST MESG
2009  3477  4755          SELTST
2010  3500  4511          JMS I   READ            /GET SELECTION
2011  3501  1524          TAD I   LREADT          /FIRST CHAR = CONTROL-C ?
2012  3502  1155          TAD     M3
2013  3503  7650          SNA CLA
2014  3504  5466          JMP I   TKBOOT          /YES, GET # COLUMNS
2015  3505  2034          ISZ     COUNT           /CORRECT # CHAR'S INPUT?
2016  3506  5512          JMP I   TREADQ          /NO, INPUT ERROR
2017  3507  1377          TAD     (READT-1        /GET TABLE ADR
2018  3510  3010          DCA     AUTPTR          /SET POINTER
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2019  3511  1410          TAD I   AUTPTR          /GET FIRST DIGIT
2020  3512  4513          JMS I   CHKOCT          /CHECK IF OCTAL
2021  3513  7106          CLL RTL                 /SHIFT TO CORRECT POSITION
2022  3514  7104          CLL RAL
2023  3515  3023          DCA     TSTNN           /STORE
2024  3516  1410          TAD I   AUTPTR          /GET SECOND DIGIT
2025  3517  4513          JMS I   CHKOCT          /CHECK & MAKE OCTAL
2026  3520  1023          TAD     TSTNN           /ADD TO CURRENT #
2027  3521  3023          DCA     TSTNN           /STORE SELECTED TEST #
2028  3522  1070          TAD     TTAT            /GET TEST ADR TABLE ADR
2029  3523  1023          TAD     TSTNN           /ADD TEST #
2030  3524  3041          DCA     TABPTR          /STORE POINTER
2031  3525  1441          TAD I   TABPTR          /GET TEST ADR
2032  3526  7550          SNA SPA                 /TEST IN TABLE?
2033  3527  5512          JMP I   TREADQ          /NO = INVALID TEST #
2034  3530  3042          DCA     TSTPTR          /YES, STORE TEST ADR
2035  3531  1410          TAD I   AUTPTR          /GET CONTROL CHAR
2036  3532  3033          DCA     SAVE            /SAVE CONTROL CHAR
2037  3533  1171          TAD     M56             /CHECK IF PERIOD
2038  3534  1033          TAD     SAVE
2039  3535  7640          SZA CLA                 /PERIOD?
2040  3536  5342          JMP     TSEL1           /NO, CONTINUE
2041  3537  7240          CLA CMA                 /YES, SET ONE-RUN FLAG
2042  3540  3051          DCA     TRONE
2043  3541  5355          JMP     TSELX           /GO TO TEST
2044
2045  3542  1033  TSEL1,  TAD     SAVE            /GET CHAR
2046  3543  0375          AND     (137            /ALLOW LOWER CASE
2047  3544  1374          TAD     (-114           /CHECK CHAR
2048  3545  7440          SZA                     /CHAR=L?
2049  3546  5352          JMP     TSEL2           /NO, CONTINUE
2050  3547  7240          CLA CMA                 /YES, SET LOOP ON TEST FLAG
2051  3550  3052          DCA     TLOOP
2052  3551  5355          JMP     TSELX           /GO TO TEST
2053  3552  1157  TSEL2,  TAD     M7              /CHECK CHAR
2054  3553  7640          SZA CLA                 /CHAR=S?
2055  3554  5512          JMP I   TREADQ          /INVALID INPUT, READ AGAIN
2056  3555  4455  TSELX,  TYPE                    /YES, TYP CR-LF AND GO TO TEST
2057  3556  5441          CRLF
2058  3557  5442          JMP I   TSTPTR
2059
2060  3574  7664
2061  3575  0137
2062  3576  3400
2063  3577  4503
              3600          PAGE
2064
2065                      /ERROR ROUTINE, ERROR MESG IS IN FORM:
2066                      /
2067                      /TEST #XX,  PC=XXXX,  ERROR #XXXX,  MESSAGE>>>>>>
2068
2069  3600  0000  RERROR, 0
2070  3601  7240          CLA CMA                 /GET ERROR PC
2071  3602  1200          TAD     RERROR
2072  3603  3025          DCA     ERRPC           /SAVE IT
```

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2073  3604  1600          TAD I   REPROR          /GET ERROR NUMBER
2074  3605  3024          DCA     ERRNM           /SAVE IT
2075  3606  4521          GETSW                   /GET SW REG
2076  3607  7004          RAL                     /GET SW 1
2077  3610  7710          SPA CLA                 /WANT ERROR MESG?
2078  3611  5250          JMP     IERRT           /NO, SKIP PRINT OUT
2079  3612  1053          TAD     TPFLG           /CHECK IF TERMINAL EXISTS
2080  3613  7650          SNA CLA
2081  3614  5250          JMP     IERRT           /NO, SKIP PRINT OUT
2082  3615  4495          TYPE                    /PRINT FIRST PART OF MESG
2083  3616  5036          ETSTNO
2084  3617  1023          TAD     TSTNM           /GET TEST #
2085  3620  7012          RTR                     /GET FIRST DIGIT
2086  3621  7010          RAR
2087  3622  4522          JMS I   PDIGIT          /PRINT IT
2088  3623  1023          TAD     TSTNM           /GET TEST #
2089  3624  4522          JMS I   PDIGIT          /PRINT SECOND DIGIT
2090  3625  4455          TYPE                    /TYPE MORE OF MESG
2091  3626  5043          PCMSG
2092  3627  1025          TAD     ERRPC           /GET ERROR PC
2093  3630  4523          JMS I   TPOCT           /PRINT IT
2094  3631  4455          TYPE                    /TYPE MORE OF MESG
2095  3632  5047          ERR
2096  3633  1024          TAD     ERRNM           /GET ERROR #
2097  3634  4523          JMS I   TPOCT           /TYPE IT
2098  3635  4455          TYPE                    /TYPE SPACES
2099  3636  5055          ERRS
2100  3637  1377          TAD     (EMAT-1         /GET ERROR MESG ADR TABLE
2101  3640  1024          TAD     ERRNM           /ADD ERROR #
2102  3641  3245          DCA     RSAVE           /STORE POINTER
2103  3642  1645          TAD I   RSAVE           /GET MESG ADR
2104  3643  3245          DCA     RSAVE           /SET FOR TYPE
2105  3644  4455          TYPE                    /TYPE END OFMESG
2106  3645  0000  RSAVE,  0
2107  3646  4455          TYPE                    /TYPE CR-LF
2108  3647  5441          CRLF
2109  3650  4521  IERRT,  GETSW                   /GET SW REG
2110  3651  7700          SMA CLA                 /STOP ON ERROR?
2111  3652  5255          JMP     .+3             /NO, RETURN
2112  3653  1024          TAD     ERRNM           /YES, GET ERROR #
2113  3654  4457          HOLD                    /STOP
2114  3655  2200          ISZ     RERROR          /SET RETURN ADR
2115  3656  7300          CLA CLL                 /CLEAR AC AND LINK
2116  3657  5600          JMP I   RERROR          /RETURN
2117
2118                      /ROUTINE TO PRINT AN OCTAL DIGIT ON THE CONSOLE DEVICE
2119
2120  3660  0000  RPDIGT, 0
2121  3661  0127          AND     P7              /MASK DIGIT
2122  3662  1140          TAD     P60             /MAKE ASCII
2123  3663  4515          JMS I   GOUT            /PRINT IT
2124  3664  5660          JMP I   RPDIGT          /RETURN
2125
2126
2127                      /ROUTINE TO CONVERT 4 DIGIT OCTAL NUMBER TO ASCII AND TYPE ON CONSOLE
```



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2128
2129  3665  0000  POCT,  0
2130  3666  3317          DCA     OCTSAV          /SAVE NUMBER
2131  3667  1312          TAD     OCTSAV          /GET NUMBER AGAIN
2132  3670  7012          RTR                     /GET FIRST DIGIT
2133  3671  7012          RTR
2134  3672  7012          RTR
2135  3673  7012          RTR
2136  3674  7010          RAR
2137  3675  4522          JMS I   PDIGIT          /PRINT IT
2138  3676  1312          TAD     OCTSAV          /GET NUMBER
2139  3677  7012          RTR                     /GET SECOND DIGIT
2140  3700  7012          RTR
2141  3701  7012          RTR
2142  3702  4522          JMS I   PDIGIT          /PRINT IT
2143  3703  1312          TAD     OCTSAV          /GET NUMBER
2144  3704  7012          RTR                     /GET THIRD DIGIT
2145  3705  7010          RAR
2146  3706  4522          JMS I   PDIGIT          /PRINT IT
2147  3707  1312          TAD     OCTSAV          /GET NUMBER
2148  3710  4522          JMS I   PDIGIT          /PRINT LAST DIGIT
2149  3711  5665          JMP I   POCT            /RETURN
2150
2151  3712  0000  OCTSAV, 0
2152
2153                      /ROUTINE TO CONVERT OCTAL NUMBER TO 3 DIGIT DECIMAL NUMBER IN ASCII STRING
2154                      /RETURN WITH CONVERT NUMBER STRING IN CNVMSG.
2155
2156  3713  0000  CNVRT,  0
2157  3714  3361          DCA     CNVNM           /SAVE NUMBER
2158  3715  3046          DCA     HUNDS           /CLEAR CONVERSION COUNTERS
2159  3716  3045          DCA     TENS
2160  3717  3044          DCA     ONES
2161  3720  1361          TAD     CNVNM           /GET NUMBER
2162  3721  2046          ISZ     HUNDS           /GET HUNDREDD DIGIT
2163  3722  1173          TAD     M144
2164  3723  7500          SMA
2165  3724  5321          JMP     .-3
2166  3725  1376          TAD     (144
2167  3726  2045          ISZ     TENS            /GET TENS DIGIT
2168  3727  1160          TAD     M12
2169  3730  7500          SMA
2170  3731  5326          JMP     .-3
2171  3732  3044          DCA     ONES            /STORE ONES DIGIT +12
2172  3733  1375          TAD     (CNVMSG         /SET MESG ADR
2173  3734  3362          DCA     MSGPTR
2174  3735  1046          TAD     HUNDS           /GET HUNDREDS DIGIT
2175  3736  1137          TAD     P57             /MAKE ASCII
2176  3737  7006          RTL                     /SET FIRST CHAR
2177  3740  7006          RTL
2178  3741  7006          RTL
2179  3742  0172          AND     M100            /MASK OTHER BITS
2180  3743  3762          DCA I   MSGPTR          /STORE CHAR IN MESG
2181  3744  1045          TAD     TENS            /GET TENS DIGIT
2182  3745  1137          TAD     P57             /MAKE ASCII
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 2183    3746  1762          TAD I   MSGPTR          /ADD FIRST CHAR
 2184    3747  3762          DCA I   MSGPTR          /STORE CHAR PAIR
 2185    3750  2362          ISZ     MSGPTR          /INC MESG POINTER
 2186    3751  1844          TAD     ONES            /GET ONES DIGIT
 2187    3752  1141          TAD     P72             /MAKE ASCII
 2188    3753  7004          RTL                     /ROTATE TO CORRECT POSITION
 2189    3754  7006          RTL
 2190    3755  7006          RTL
 2191    3756  0172          AND     M100            /MASK OTHER BITS (NULL = TERMINATOR)
 2192    3757  3762          DCA I   MSGPTR          /STORE CHAR
 2193    3760  5711          JMP I   CNVRT           /RETURN
 2194
 2195    3761  0000  CNVNM, 0                       /SAVE NUMBER
 2196    3762  0000  MSGPTR, 0                      /MESG POINTER
 2197
 2198    3775  5435
 2199    3776  0144
 2200    3777  4677
               4000          PAGE
 2201
 2202                  /TYPE ROUTINE - TO TYPE ASCII MESSAGES
 2203                  /CALL:  TYPE + JUMP TO TYPE ROUTINE
 2204                  /       MESADR = MESSAGE ADDRESS
 2205                  /RETURN WITH CLEAR AC AND LINK
 2206
 2207    4000  0000  RTYPE,  0
 2208    4001  7300          CLA CLL                 /CLEAR
 2209    4002  1853          TAD     TPFLG           /GET TERMINAL FLAG
 2210    4003  7640          SZA CLA                 /TERMINAL THERE?
 2211    4004  5207          JMP     .+3             /YES, CONTINUE
 2212    4005  2200  RT2,    ISZ     RTYPE           /INC RETURN ADR
 2213    4006  5600          JMP I   RTYPE           /RETURN
 2214    4007  1600          TAD I   RTYPE           /GET MESG ADR
 2215    4010  3043          DCA     MSGADR          /STORE
 2216    4011  1443  RT1,    TAD I   MSGADR          /GET CHAR PAIR
 2217    4012  7112          CLL RTR
 2218    4013  7112          CLL RTR
 2219    4014  7112          CLL RTR
 2220    4015  4222          JMS     OUT             /PRINT CHAR
 2221    4016  1443          TAD I   MSGADR          /GET CHAR PAIR
 2222    4017  4222          JMS     OUT             /PRINT CHAR
 2223    4020  2043          ISZ     MSGADR          /ADR NEXT CHAR PAIR
 2224    4021  5211          JMP     RT1             /CONTINUE
 2225
 2226    4022  0000  OUT,    0
 2227    4023  0142          AND     P77             /MASK CHAR
 2228    4024  7450          SNA                     /CONTINUE IF NOT END
 2229    4025  5205          JMP     RT2             /ZERO, RETURN
 2230    4026  3033          DCA     SAVE            /SAVE CHAR
 2231    4027  1033          TAD     SAVE            /GET CHAR
 2232    4030  1377          TAD     (-53            /CHECK CHAR
 2233    4031  7450          SNA                     /WANT CR-LF?
 2234    4032  5244          JMP     OUTCL           /YES, DO CR-LF
 2235    4033  1162          TAD     M20             /CHECK CHAR
 2236    4034  7650          SNA CLA                 /WANT LF?
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 2237    4035  5251          JMP     OUTLF           /YES, DO LF
 2238    4036  1033          TAD     SAVE            /GET CHAR AGAIN
 2239    4037  0134          AND     P40             /MAKE ASCII
 2240    4040  7650          SNA CLA
 2241    4041  1143          TAD     P100
 2242    4042  1033          TAD     SAVE
 2243    4043  5253          JMP     OUTCHR          /PRINT CHAR
 2244
 2245    4044  7300  OUTCL,  CLA CLL                 /CLEAR
 2246    4045  1132          TAD     P15             /GET CR
 2247    4046  4501          JMS I   TTLS            /PRINT
 2248    4047  4476          JMS I   TTSF            /WAIT FOR READY
 2249    4050  5247          JMP     .-1
 2250    4051  7300  OUTLF,  CLA CLL                 /CLEAR
 2251    4052  1131          TAD     P12             /GET LF
 2252    4053  4501  OUTCHR, JMS I   TTLS            /PRINT CHR
 2253    4054  4476          JMS I   TTSF            /WAIT FOR READY
 2254    4055  5254          JMP     .-1
 2255    4056  7300          CLA CLL                 /CLEAR
 2256    4057  5622          JMP I   OUT             /RETURN
 2257
 2258                  /ROUTINE TO LOAD SINGLE CHARACTERS TO LA180 PRINTER
 2259                  /CALL:          LOAD
 2260
 2261    4060  0000  RLOAD,  0
 2262    4061  4464          CHECK                   /CHECK FOR CONTROL
 2263    4062  7300  RLA,    CLA CLL                 /CHECK READY TIME
 2264    4063  3303          DCA     RLDC
 2265    4064  1376          TAD     (-300
 2266    4065  3304          DCA     RLDCC
 2267    4066  2303  RLB,    ISZ     RLDC
 2268    4067  5275          JMP     RLC
 2269    4070  2304          ISZ     RLDCC
 2270    4071  5275          JMP     RLC
 2271    4072  4463          ERROR                   /PRINTER NOT READY
 2272    4073  0016          16
 2273    4074  5660          JMP I   RLOAD           /EXIT
 2274    4075  4502  RLC,    JMS I   TPSKF           /CHECK FOR PRINTER READY
 2275    4076  5266          JMP     RLB             /WAIT FOR READY
 2276    4077  1033          TAD     SAVE
 2277    4100  4506          JMS I   TPCLP           /LOAD CHAR
 2278    4101  7300          CLA CLL                 /CLEAR AC AND LINK
 2279    4102  5660          JMP I   RLOAD           /RETURN
 2280
 2281    4103  0000  RLDC,   0                       /DELAY COUNT.
 2282    4104  0000  RLDCC,  0
 2283
 2284
 2285
 2286                  /ROUTINE TO LOAD MULTIPLE CHARACTERS (NOT TEXT STRINGS) TO LA180
 2287                  /WILL LOAD CHAR ONCE IT COUNT = 0
 2288                  /PUT CHAR IN AC AND CHAR COUNT IN "COUNT" (NEGATIVE NUMBER)
 2289                  /CALL:          MLOAD
 2290
 2291    4105  0000  MLOAD, 0
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2292    4106  3033          DCA     SAVE            /SAVE CHAR
2293    4107  1033          TAD     SAVE            /GET CHAR
2294    4110  4456          LOAD                    /LOAD CHAR
2295    4111  2034          ISZ     COUNT           /INC COUNT
2296    4112  1034          TAD     COUNT           /CHECK IF WAS ZERO
2297    4113  7710          SPA CLA                 /SKIP IF WAS ZERO OR IS ZERO
2298    4114  5307          JMP     RMLOAD+2        /CONTINUE
2299    4115  5705          JMP I   RMLOAD          /RETURN
2300    4116  7500
2301    4117  7725
              4700          PAGE
2302
2303                        /ROUTINE TO PRINT ASCII MESSAGES ON THE LA180 PRINTER
2304                        /SPECIAL CHARACTERS ARE LISTED AT THE BEGINNING OF THE
2305                        /PROGRAM MESSAGE AREA.
2306                        /CALL:  PRINT + CALL TO SUBROUTINE
2307                        /       MESADR + MESSAGE ADDRESS
2308                        /RETURN WITH CLEAR AC AND LINK
2309
2310    4200  0000    RPRINT, 0
2311    4201  7300          CLA CLL                 /CLEAR
2312    4202  1600          TAD I   RPRINT          /GET MESG ADR
2313    4203  3043          DCA     MSGADR          /STORE
2314    4204  2200          ISZ     RPRINT          /INC RETURN ADR
2315    4205  1443    RP1,  TAD I   MSGADR          /GET CHAR PAIR
2316    4206  7112          CLL RTR
2317    4207  7112          CLL RTR
2318    4210  7112          CLL RTR
2319    4211  4216          JMS     PRT             /LOAD CHAR
2320    4212  1443          TAD I   MSGADR          /GET PAIR AGAIN
2321    4213  4216          JMS     PRT             /LOAD CHAR
2322    4214  2043          ISZ     MSGADR          /SET NEXT CHAR ADR
2323    4215  5205          JMP     RP1             /CONTINUE
2324
2325    4216  0000    PRT,  0
2326    4217  0142          AND     P77             /MASK CHAR
2327    4220  7450          SNA                     /CONTINUE IF NOT END
2328    4221  5600          JMP I   RPRINT          /ZERO, RETURN
2329    4222  3033          DCA     SAVE            /SAVE CHAR
2330    4223  1033          TAD     SAVE            /GET AGAIN
2331    4224  1377          TAD     (-41            /CHECK CHAR
2332    4225  7450          SNA                     /WANT FF?
2333    4226  5246          JMP     PRTFF           /YES, DO FF
2334    4227  1160          TAD     M12             /CHECK AGAIN
2335    4230  7450          SNA                     /WAND CRLF?
2336    4231  5254          JMP     PRTCL           /YES, DO CRLF
2337    4232  1376          TAD     (-17            /CHECK AGAIN
2338    4233  7450          SNA                     /WANT CR ONLY?
2339    4234  5251          JMP     PRTCR           /YES, DO CR
2340    4235  1153          TAD     M1              /CHECK AGAIN
2341    4236  7650          SNA CLA                 /WANT LF ONLY?
2342    4237  5257          JMP     PRTLF           /YES, DO LF
2343    4240  1033          TAD     SAVE            /GET CHAR AGAIN
2344    4241  0134          AND     P40             /MAKE ASCII
2345    4242  7650          SNA CLA
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2346    4243  1163          TAD     P100
2347    4244  1033          TAD     SAVE
2348    4245  5260          JMP     PRTCHR          /LOAD CHAR
2349
2350    4246  7300    PRTFF,  CLA CLL                 /CLEAR
2351    4247  1375          TAD     (14             /GET FF
2352    4250  5260          JMP     PRTCHR          /GO LOAD FF
2353    4251  7300    PRTCR,  CLA CLL                 /CLEAR
2354    4252  1132          TAD     P15             /GET CR
2355    4253  5260          JMP     PRTCHR          /GO LOAD CR
2356    4254  7300    PRTCL,  CLA CLL                 /CLEAR
2357    4255  1132          TAD     P15             /GET CR
2358    4256  4456          LOAD                    /LOAD CR
2359    4257  1131    PRTLF,  TAD     P12             /GET LF
2360    4260  4456    PRTCHR, LOAD                    /LOAD CHAR
2361    4261  5616          JMP I   PRT             /RETURN
2362
2363                        /ROUTINE TO PRINT TEST HEADER ON LA180
2364                        /# OF COLUMNS WILL ALSO BE PRINTED FOR TEST 25 ONLY
2365
2366    4262  0000    RPRHDR, 0
2367    4263  7300          CLA CLL                 /CLEAR
2368    4264  1145          TAD     P177            /SET RUBOUT
2369    4265  4456          LOAD                    /CLEAR LA180 CHAR BUFFER
2370    4266  1331          TAD     SVTST           /GET SAVED TEST #
2371    4267  7041          CIA                     /NEGATE IT
2372    4270  1023          TAD     TSTNM           /ADD CURRENT TEST #
2373    4271  7650          SNA CLA                 /CHECK IF PRINTED THIS # LAST
2374    4272  5326          JMP     HDRX            /YES, PRINT BLANK LINE & EXIT
2375    4273  1023          TAD     TSTNM           /NO, STORE NEW NUMBER
2376    4274  3331          DCA     SVTST
2377    4275  4461          PRINT                   /LOAD TEST # MESG
2378    4276  5020          TSTNO
2379    4277  1023          TAD     TSTNM           /GET TEST #
2380    4300  7012          RTR                     /GET FIRST DIGIT
2381    4301  7010          RAR
2382    4302  0127          AND     P7              /MAKE ASCII
2383    4303  1140          TAD     P60
2384    4304  4456          LOAD                    /LOAD IT
2385    4305  1023          TAD     TSTNM           /GET TEST #
2386    4306  0127          AND     P7              /GET LAST DIGIT
2387    4307  1140          TAD     P60             /MAKE ASCII
2388    4310  4456          LOAD                    /LOAD IT
2389    4311  4461          PRINT                   /PRINT LINE
2390    4312  5440          LF
2391    4313  1154          TAD     M25             /CHECK IF TEST 25
2392    4314  1023          TAD     TSTNM
2393    4315  7640          SZA CLA                 /IS IT?
2394    4316  5326          JMP     HDRX            /NO, PRINT BLANK LINE & EXIT
2395    4317  1026          TAD     WIDTH           /GET NUMBER OF COLUMNS
2396    4320  7041          CIA                     /MAKE POSITIVE
2397    4321  4517          JMS I   TCNVRT          /CONVERT NUMBER TO DECIMAL, ASCII STRING
2398    4322  4461          PRINT                   /PRINT IT
2399    4323  5435          CNVMSG
2400    4324  4461          PRINT
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2401   4325  5030          COLMN
2402   4326  4461  HDRX,   PRINT                   /BLANK LINE
2403   4327  5440          LF
2404   4330  5662          JMP I   RPRHDR          /RETURN
2405
2406   4331  0000  SVTST,  0                       /SAVE TEST # FOR CHECK
2407
2408   4375  0014
2409   4376  7761
2410   4377  7737
             4400          PAGE

2411                       /ROUTINE TO READ 4 CHARS FROM THE CONSOLE KEYBOARD
2412                       /
2413                       /RUBOUTS DELETE CHARACTERS
2414                       /CONTROL-U (^U) RESTARTS INPUT ROUTINE
2415
2416
2417   4400  0000  TREAD,  0
2418   4401  7300  READ0,  CLA CLL                 /CLEAR
2419   4402  3303          DCA     RFLAG           /CLEAR RUBOUT FLAG
2420   4403  1156  READ1,  TAD     M4              /SET 4 CHARS TO READ
2421   4404  3034          DCA     COUNT           /STORE
2422   4405  1124          TAD     LREADT          /GET CHAR STORE TABLE ADR
2423   4406  3041          DCA     TABPTR          /SET POINTER
2424   4407  4472  READ2,  JMS I   TKSF            /KYBD FLAG SET?
2425   4410  5207          JMP     .-1             /NO, WAIT
2426   4411  4475          JMS I   TKRB            /YES, READ CHAR
2427   4412  0145          AND     P177            /MAKE ASCII
2428   4413  3441          DCA I   TABPTR          /SAVE CHAR
2429   4414  1170          TAD     M40             /CHECK CHAR
2430   4415  1441          TAD I   TABPTR
2431   4416  7650          SNA CLA                 /CHAR=SPACE?
2432   4417  5207          JMP     READ2           /YES, IGNORE IT
2433   4420  1154          TAD     M25             /CHAR = CONTROL-U
2434   4421  1441          TAD I   TABPTR
2435   4422  7650          SNA CLA
2436   4423  5254          JMP     READU           /YES, TYPE IT AND RESTART
2437   4424  1174          TAD     M177            /CHECK CHAR
2438   4425  1441          TAD I   TABPTR
2439   4426  7650          SNA CLA                 /CHAR=RUBOUT?
2440   4427  5257          JMP     READD           /YES, DELETE LAST CHAR
2441   4430  1161          TAD     M15             /CHECK FOR CR= END OF INPUT
2442   4431  1441          TAD I   TABPTR
2443   4432  7650          SNA CLA                 /CHAR=CR?
2444   4433  5600          JMP I   TREAD           /YES, RETURN
2445   4434  1303          TAD     RFLAG           /CHECK RUBOUT FLAG
2446   4435  7650          SNA CLA                 /RECEIVED RUBOUT?
2447   4436  5241          JMP     .+3             /NO, CONTINUE
2448   4437  1144          TAD     P134            /GET BACKSLASH
2449   4440  4515          JMS I   GOUT            /PRINT IT
2450   4441  3303          DCA     RFLAG           /CLEAR RUBOUT FLAG
2451   4442  1441          TAD I   TABPTR          /GET CHAR
2452   4443  4501          JMS I   TTLS            /ECHO CHAR
2453   4444  4476          JMS I   TTSF
2454   4445  5244          JMP     .-1
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2455   4446  2041          ISZ     TABPTR          /INC TABLE POINTER
2456   4447  2034          ISZ     COUNT           /INC CHAR COUNT
2457   4450  5207          JMP     READ2           /READ CHAR
2458
2459   4451  4455  READQ,  TYPE                    /TYPE QUESTION MASK
2460   4452  5443          QUES
2461   4453  5201          JMP     READ0           /READ NEW STRING
2462   4454  4455  READU,  TYPE                    /TYPE CONTROL-U
2463   4455  5445          CNTLU
2464   4456  5201          JMP     READ0           /RESTART ROUTINE
2465   4457  7240  READD,  CLA CMA                 /SET AC=-1
2466   4460  1034          TAD     COUNT           /ADD COUNT
2467   4461  3034          DCA     COUNT           /STORE NEW COUNT
2468   4462  1377          TAD     (4              /CHECK CHAR COUNT
2469   4463  1034          TAD     COUNT
2470   4464  7710          SPA CLA                 /LESS THAN -5?
2471   4465  5203          JMP     READ1           /YES, RESTART READ ROUTINE
2472   4466  7240          CLA CMA                 /SET AC=-1
2473   4467  1041          TAD     TABPTR          /SUBTRACT ONE FROM TABLE POINTER
2474   4470  3041          DCA     TABPTR          /STORE NEW POINTER
2475   4471  1303          TAD     RFLAG           /CHECK RUBOUT FLAG
2476   4472  7640          SZA CLA                 /SET?
2477   4473  5276          JMP     .+3             /YES, SKIP BACKSLASH
2478   4474  1144          TAD     P134            /NO, PRINT BACKSLASH
2479   4475  4515          JMS I   GOUT
2480   4476  1441          TAD I   TABPTR          /GET DELETED CHAR
2481   4477  4515          JMS I   GOUT            /PRINT IT
2482   4500  7240          CLA CMA                 /SET RUBOUT FLAG
2483   4501  3303          DCA     RFLAG
2484   4502  5207          JMP     READ2           /READ NEXT CHAR
2485
2486   4503  0000  RFLAG,  0
2487
2488   4504  0000  READT,  0
2489   4505  0000          0
2490   4506  0000          0
2491   4507  0000          0
2492
2493                       /ROUTINE TO CHECK FOR OCTAL DIGIT INPUT
2494
2495   4510  0000  TCKOUT, 0
2496   4511  4320          JMS     TCHKNR          /CHECK IF NUMBER FIRST
2497   4512  0130          AND     P10             /CHECK IF OCTAL
2498   4513  7640          SZA CLA                 /# = 8 OR 9?
2499   4514  5512          JMP I   TREAD0          /YES, INPUT ERROR
2500   4515  1033          TAD     SAVE            /OK, GET #
2501   4516  0127          AND     P7              /MAKE OCTAL
2502   4517  5710          JMP I   TCKOUT          /RETURN
2503
2504
2505
2506
2507                       /ROUTINE TO CHECK INPUTTED CHAR IF A NUMBER!
2508
2509   4520  0000  TCHKNR, 0
```

```
 2510    4521  3033          DCA     SAVE            /SAVE CHAR
 2511    4522  1376          TAD     (-60            /CHECK CHAR
 2512    4523  1033          TAD     SAVE
 2513    4524  7710          SPA CLA                 /NUMBER?
 2514    4525  5517          JMP I   IREADQ          /NO, INPUT ERROR
 2515    4526  1375          TAD     (-72            /CHECK AGAIN
 2516    4527  1033          TAD     SAVE
 2517    4530  7700          SMA CLA                 /NUMBER?
 2518    4531  5512          JMP I   TREADQ          /NO, INPUT ERROR
 2519    4532  1033          TAD     SAVE            /SET CHAR
 2520    4533  0374          AND     (17             /MASK NOT EQUAL
 2521    4534  5720          JMP I   TCHKNR          /RETURN
 2522
 2523
 2524    4535  2601  IOTAB,  RKSF+1                  /I-O INSTRUCTION ADDRESS TABLE
 2525    4536  2606          RKCC+1
 2526    4537  2611          RKRB+1
 2527    4540  2614          RKDB+1
 2528    4541  2617          RTSF+1
 2529    4542  2624          RTCF+1
 2530    4543  2627          RTPC+1
 2531    4544  2632          RTLS+1
 2532    4545  0000          0                       /END OF TTY IOT'S
 2533    4546  2637          RPSKF+3
 2534    4547  2651          RPCLF+3
 2535    4550  2561          RPSTB+3
 2536    4551  2673          RPSIE+3
 2537    4552  2705          RPCLP+3
 2538    4553  0000          0                       /END OF TABLE
 2539
 2540
 2541    4574  0017
 2542    4575  7706
 2543    4576  7720
 2544    4577  0004
               4600          PAGE
 2545
 2546                  /TEST ADDRESS TABLE
 2547                  /
 2548                  /0 = NON-EXISTENT TEST, SKIP IN SEQUENCE
 2549                  /-1 = END OF TEST SEQUENCE, RESTART WITH TEST #20
 2550
 2551    4600  0400  TAT,    TEST0
 2552    4601  0714          TEST1
 2553    4602  1000          TEST2
 2554    4603  0000          0               /TEST3
 2555    4604  0000          0               /TEST4
 2556    4605  0000          0               /TEST5
 2557    4606  0000          0               /TEST6
 2558    4607  0000          0               /TEST7
 2559    4610  0000          0               /TEST10
 2560    4611  0000          0               /TEST11
 2561    4612  0000          0               /TEST12
 2562    4613  0000          0               /TEST13
 2563    4614  0000          0               /TEST14
```



```
 2564    4615  0000          0               /TEST15
 2565    4616  0000          0               /TEST16
 2566    4617  0000          0               /TEST17
 2567    4620  1200          TEST20
 2568    4621  1227          TEST21
 2569    4622  1274          TEST22
 2570    4623  1331          TEST23
 2571    4624  1400          TEST24
 2572    4625  1600          TEST25
 2573    4626  2000          TEST26
 2574    4627  2054          TEST27
 2575    4630  2220          TEST30
 2576    4631  2212          TEST31
 2577    4632  7777          -1              /TEST32 .....   END OF TEST SEQUENCE
 2578    4633  0000          0               /TEST33
 2579    4634  0000          0               /TEST34
 2580    4635  0000          0               /TEST35
 2581    4636  0000          0               /TEST36
 2582    4637  0000          0               /TEST37
 2583    4640  0000          0               /TEST40
 2584    4641  0000          0               /TEST41
 2585    4642  0000          0               /TEST42
 2586    4643  0000          0               /TEST43
 2587    4644  0000          0               /TEST44
 2588    4645  0000          0               /TEST45
 2589    4646  0000          0               /TEST46
 2590    4647  0000          0               /TEST47
 2591    4650  0000          0               /TEST50
 2592    4651  0000          0               /TEST51
 2593    4652  0000          0               /TEST52
 2594    4653  0000          0               /TEST53
 2595    4654  0000          0               /TEST54
 2596    4655  0000          0               /TEST55
 2597    4656  0000          0               /TEST56
 2598    4657  0000          0               /TEST57
 2599
 2600    4660  2246          TEST60
 2601    4661  2400          TEST61
 2602    4662  2450          TEST62
 2603    4663  2477          TEST63
 2604    4664  0000          0               /TEST64
 2605    4665  0000          0               /TEST65
 2606    4666  0000          0               /TEST66
 2607    4667  0000          0               /TEST67
 2608    4670  0000          0               /TEST70
 2609    4671  0000          0               /TEST71
 2610    4672  0000          0               /TEST72
 2611    4673  0000          0               /TEST73
 2612    4674  0000          0               /TEST74
 2613    4675  0000          0               /TEST75
 2614    4676  0000          0               /TEST76
 2615    4677  0000          0               /TEST77
 2616
 2617
 2618
```

```
                        /ERROR MESSAGE ADDRESS TABLE
                        
4700  5476    EMAT,   ERR1
4701  5511            ERR2
4702  5527            ERR3
4703  5546            ERR4
4704  5561            ERR5
4705  5602            ERR6
4706  5617            ERR7
4707  5640            ERR10
4710  5655            ERR11
4711  5676            ERR12
4712  5711            ERR13
4713  5733            ERR14
4714  5755            ERR15
4715  5777            ERR16
                        
                        /PROGRAM MESSAGES
                        
                        /SPECIAL CHARACTERS AND FUNCTIONS:
                        
                        /       +       =       CRLF
                        /       !       =       CR
                        /       ;       =       LF
                        /       |       =       FF
                        
4716  5315    HEADER, TEXT    "+MAINDEC-08-DILAC-B-LA180 PRINTER DIAGNOSTIC+!"
4717  0111
4720  1604
4721  0503
4722  5560
4723  7055
4724  0411
4725  1401
4726  0355
4727  0253
4730  1401
4731  6170
4732  6040
4733  2022
4734  1116
4735  2405
4736  2240
4737  0411
4740  0107
4741  1617
4742  2324
4743  1103
4744  5373
4745  0000
4746  5343    COLUMN, TEXT    "+# COLUMNS = "
4747  4003
4750  1714
4751  2515
4752  1623
```



```
4753  4075
4754  4000
4755  5323    SELTST, TEXT    "+SELECT TEST # "
4756  0514
4757  0503
4760  2440
4761  2405
4762  2324
4763  4043
4764  4040
4765  0000
4766  5323    DSMSG1, TEXT    /+SWR = /
4767  2722
4770  4075
4771  4000
4772  4040    DSMSG2, TEXT    /   NEW = /
4773  4016
4774  0527
4775  4075
4776  4000
5000  4777    WTMSG,  TEXT    /WAITING, TYPE SPACE TO CONTINUE+/
5001  1124
5002  1116
5003  0754
5004  4024
5005  3120
5006  0540
5007  2320
5010  0103
5011  0540
5012  2417
5013  4003
5014  1716
5015  2411
5016  1625
5017  0553
5020  0000
5021  7373    TSTNO,  TEXT    ";;TEST NUMBER  "
5022  2405
5023  2324
5024  4016
5025  2515
5026  0205
5027  2240
5030  4000
5031  4040    COLMN,  TEXT    "  COLUMNS;"
5032  0317
5033  1425
5034  1516
5035  2373
5036  0000
5037  5324    ETSTNO, TEXT    "+TEST # "
5040  0523
5041  2440
5042  4340
```

```
                5042  0000
 2654           5043  5440    PCMSG,  TEXT    ',  PC='
                5044  4020
                5045  0375
                5046  0000
 2655           5047  5440    ERR,    TEXT    ',  ERROR #'
                5050  4025
                5051  2222
                5052  1722
                5053  4043
                5054  0000
 2656           5055  5440    ERRS,   TEXT    ',  '
                5056  4000
 2657           5057  7305    PASMSG, TEXT    ';END OF PASS  #'
                5060  1504
                5061  4017
                5062  0640
                5063  2001
                5064  2323
                5065  4040
                5066  4300
 2658           5067  2022    T2M1,   TEXT    'PRINT SPEED MANUAL TIMING+'
                5070  1116
                5071  2440
                5072  2120
                5073  0505
                5074  0440
                5075  1501
                5076  1625
                5077  0114
                5100  4024
                5101  1115
                5102  1116
                5103  0753
                5104  0000
 2659           5105  2025    T2M2,   TEXT    'PUT SWITCH 4 UP TO START TIMING+'
                5106  2440
                5107  2327
                5110  1124
                5111  0310
                5112  4064
                5113  4025
                5114  2040
                5115  2417
                5116  4023
                5117  2401
                5120  2224
                5121  4024
                5122  1115
                5123  1116
                5124  0753
                5125  0000
 2660           5126  2025    T2M3,   TEXT    'PUT SWITCH 4 DOWN AT END OF 1 MINUTE+'
                5127  2440
                5130  2327
```



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                5131  1124
                5132  0310
                5133  4064
                5134  4004
                5135  1727
                5136  1640
                5137  0124
                5140  4005
                5141  1604
                5142  4017
                5143  0640
                5144  5140
                5145  1511
                5146  1625
                5147  2405
                5150  5300
 2661           5151  1517    T2EN,   TEXT    /NO METHOD OF TIMING AVAILABLE+/
                5152  4015
                5153  0524
                5154  1017
                5155  0440
                5156  1706
                5157  4024
                5160  1115
                5161  1116
                5162  0740
                5163  0126
                5164  0111
                5165  1401
                5166  0214
                5167  0553
                5170  0000
 2662           5171  5320    PRSP1,  TEXT    '+PRINT SPEED IS '
                5172  2211
                5173  1624
                5174  4023
                5175  2005
                5176  0504
                5177  4011
                5200  2340
                5201  0000
 2663           5202  0120    PRSP2,  TEXT    'APPROX '
                5203  2022
                5204  1730
                5205  4000
 2664           5206  4040    PRSP3,  TEXT    '  LINES/MINUTE , WITH '
                5207  1411
                5210  1605
                5211  2357
                5212  1611
                5213  1625
                5214  2405
                5215  4054
                5216  4027
                5217  1124
```

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                5220  1040
                5221  0000
 2665           5222  4040    PRSP4,  TEXT    "  CHARS/LINE+"
                5223  0310
                5224  0122
                5225  2357
                5226  1411
                5227  1605
                5230  5300
 2666
 2667           5231  7316    NCMSG,  TEXT    "?NO CONSOLE TERMINAL;"
                5232  1740
                5233  0317
                5234  1623
                5235  1714
                5236  0540
                5237  2405
                5240  2215
                5241  1116
                5242  0114
                5243  7300
 2668           5244  0310    TCHAR,  TEXT    "CHAR # "
                5245  0122
                5246  4075
                5247  4000
 2669           5250  2425    T0MSG0, TEXT    /TURN POWER OFF & SET OFF LINE+/
                5251  2216
                5252  4020
                5253  1727
                5254  0522
                5255  4017
                5256  0606
                5257  4046
                5260  4023
                5261  0524
                5262  4017
                5263  0606
                5264  4014
                5265  1116
                5266  0553
                5267  0000
 2670           5270  1713    T0MSG1, TEXT    /OK, TURN POWER ON+/
                5271  5440
                5272  2425
                5273  2216
                5274  4020
                5275  1727
                5276  0522
                5277  4017
                5300  1653
                5301  0000
 2671           5302  1713    T0MSG2, TEXT    /OK, SET PRINTER TO ON-LINE+/
                5303  5440
                5304  2305
                5305  2440
```



```
                5306  2022
                5307  1116
                5310  2405
                5311  2240
                5312  2417
                5313  4017
                5314  1655
                5315  1411
                5316  1605
                5317  5300
 2672           5320  1713    T0MSG3, TEXT    /OK, TRY PAPER OUT SWITCH+/
                5321  5440
                5322  2422
                5323  3140
                5324  2001
                5325  2005
                5326  2240
                5327  1725
                5330  2440
                5331  2327
                5332  1124
                5333  0310
                5334  5300
 2673           5335  1713    T0MSG4, TEXT    /OK, RESTORE PRINTER TO ON-LINE+/
                5336  5440
                5337  2205
                5340  2324
                5341  1722
                5342  0540
                5343  2022
                5344  1116
                5345  2405
                5346  2240
                5347  2417
                5350  4017
                5351  1655
                5352  1411
                5353  1605
                5354  5300
 2674           5355  5555    T1MSG1, TEXT    "----- "
                5356  5555
                5357  5540
                5360  0000
 2675           5361  4011    T1MSG2, TEXT    " INCH FORM FEED -----!"
                5362  1603
                5363  1040
                5364  0617
                5365  2215
                5366  4006
                5367  0505
                5370  0440
                5371  5555
                5372  5555
                5373  5572
                5374  0000
```

```
 2676   5375  2305   TIMSG3, TEXT   'SET FORM FEED SWITCH TO '
        5376  2440
        5377  0617
        5400  2215
        5401  4006
        5402  0505
        5403  0440
        5404  2327
        5405  1124
        5406  0310
        5407  4024
        5410  1740
        5411  4000
 2677   5412  4040   TIMSG4, TEXT   '  INCHES & DEPRESS TOF RESET SWITCH+'
        5413  1116
        5414  0310
        5415  0523
        5416  4046
        5417  4004
        5420  0520
        5421  2205
        5422  2323
        5423  4024
        5424  1706
        5425  4022
        5426  0523
        5427  0524
        5430  4023
        5431  2711
        5432  2403
        5433  1053
        5434  0000
 2678   5435  4040   CNVMSG, TEXT   /   /
        5436  4000
 2679   5437  7200   CR,     TEXT   '<'
 2680   5440  7300   LF,     TEXT   '='
 2681   5441  5300   CRLF,   TEXT   '+'
 2682   5442  4100   FF,     TEXT   '|'
 2683   5443  5377   QUES,   TEXT   '+?+'
        5444  5300
 2684   5445  3625   CNTLU,  TEXT   /^U+/
        5446  5300
 2685
 2686   5447  4063   TITAB,  TEXT   ' 3 '
        5450  4000
 2687   5451  6356           TEXT   '3.5'
        5452  6500
 2688   5453  4064           TEXT   ' 4 '
        5454  4000
 2689   5455  6556           TEXT   '5.5'
        5456  6500
 2690   5457  4066           TEXT   ' 6 '
        5460  4000
 2691   5461  4067           TEXT   ' 7 '
        5462  4000
```



```
 2692   5463  4070           TEXT   ' 8 '
        5464  4000
 2693   5465  7056           TEXT   '8.5'
        5466  6500
 2694   5467  6161           TEXT   '11 '
        5470  4000
 2695   5471  6162           TEXT   '12 '
        5472  4000
 2696   5473  6164           TEXT   '14 '
        5474  4000
 2697
 2698   5475  0000           0                      /END OF TABLE
 2699
 2700                 /ERROR MESSAGES
 2701
 2702   5476  2205   ERR1,   TEXT   /READY SET, POWER OFF/
        5477  0104
        5500  3140
        5501  2305
        5502  2454
        5503  4020
        5504  1727
        5505  0522
        5506  4017
        5507  0606
        5510  0000
 2703   5511  2235   ERR2,   TEXT   /READY SET, PRINTER OFF LINE/
        5512  0104
        5513  3140
        5514  2305
        5515  2454
        5516  4020
        5517  2211
        5520  1624
        5521  0522
        5522  4017
        5523  0606
        5524  4014
        5525  1116
        5526  0500
 2704   5527  2205   ERR3,   TEXT   /READY CLEAR, PRINTER ON LINE/
        5530  0104
        5531  3140
        5532  0314
        5533  0501
        5534  2254
        5535  4020
        5536  2211
        5537  1624
        5540  0522
        5541  4017
        5542  1640
        5543  1411
        5544  1605
        5545  0000
```

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                5546  2205    ERR4,   TEXT    /READY SET, PAPER OUT/
                5547  0104
                5550  3140
                5551  2305
                5552  2454
                5553  4020
                5554  0120
                5555  0522
                5556  4017
                5557  2524
                5560  0000
 2705           5561  2205    ERR5,   TEXT    /READY NOT SET AFTER ERROR CLEARED/
                5562  0104
                5563  3140
                5564  1617
                5565  2440
                5566  2305
                5567  2440
                5570  0106
                5571  2405
                5572  2240
                5573  0522
                5574  2217
                5575  2240
                5576  0314
                5577  0501
                5600  2205
                5601  0400
 2707           5602  2003    ERR6,   TEXT    /PCLF DID NOT CLEAR READY/
                5603  1406
                5604  4004
                5605  1104
                5606  4016
                5607  1724
                5610  4003
                5611  1405
                5612  0122
                5613  4022
                5614  0501
                5615  0431
                5616  0000
 2708           5617  2205    ERR7,   TEXT    /READY DID NOT SET AFTER CHAR LOAD/
                5620  0104
                5621  3140
                5622  0411
                5623  0440
                5624  1617
                5625  2440
                5626  2305
                5627  2440
                5630  0106
                5631  2405
                5632  2240
                5633  0310
                5634  0122
```



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                5635  4014
                5636  1701
                5637  0400
 2709           5640  2003    ERR10,  TEXT    /PCLP DID NOT CLEAR READY/
                5641  1420
                5642  4004
                5643  1104
                5644  4016
                5645  1724
                5646  4003
                5647  1405
                5650  0122
                5651  4022
                5652  0501
                5653  0431
                5654  0000
 2710           5655  2205    ERR11,  TEXT    /READY DID NOT SET AFTER CHAR LOAD/
                5656  0104
                5657  3140
                5660  0411
                5661  0440
                5662  1617
                5663  2440
                5664  2305
                5665  2440
                5666  0106
                5667  2405
                5670  2240
                5671  0310
                5672  0122
                5673  4014
                5674  1701
                5675  0400
 2711           5676  2516    ERR12,  TEXT    /UNEXPECTED INTERRUPT/
                5677  0530
                5700  2005
                5701  0324
                5702  0504
                5703  4011
                5704  1024
                5705  0522
                5706  2325
                5707  2824
                5710  0000
 2712           5711  1116    ERR13,  TEXT    /INTER + READY CLEAR, ENABLED & ION/
                5712  2405
                5713  2240
                5714  5540
                5715  2205
                5716  0104
                5717  3140
                5720  0314
                5721  0501
                5722  2254
                5723  4005
```

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                5724  1601
                5725  0214
                5726  0584
                5727  4046
                5730  4011
                5731  1716
                5732  0000
 2713           5733  1617    ERR14,  TEXT    /NO INTER - READY SET, ENABLED & ION/
                5734  4011
                5735  1624
                5736  0522
                5737  4055
                5740  4022
                5741  0501
                5742  0431
                5743  4023
                5744  0524
                5745  5440
                5746  0516
                5747  0102
                5750  1405
                5751  0440
                5752  4040
                5753  1117
                5754  1600
 2714           5755  1116    ERR15,  TEXT    /INTER - READY SET, ENABLED BUT IOF/
                5756  2405
                5757  2240
                5760  5340
                5761  2205
                5762  0104
                5763  3140
                5764  2305
                5765  2454
                5766  4005
                5767  1601
                5770  0214
                5771  0584
                5772  4002
                5773  2524
                5774  4011
                5775  1706
                5776  0000
 2715           5777  2022    ERR16,  TEXT    /PRINTER NOT READY/
                6000  1116
                6001  2405
                6002  2240
                6003  1617
                6004  2440
                6005  2205
                6006  0104
                6007  3100
 2716
 2717
 2718
```



```
 2719                           0
```

```
0000  11100000  10000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

0200  11100000  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00001111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110111

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00011111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  00000000  00000001

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  00000000  00000000  00000111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11100000  00000000  00001111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  10000001  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  10000000  00000000  00000111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  00000000  00000000  00000000  00000000  00000111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11110000  00000000  00000000  00000001

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  10000000  00000111

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111110  00000000  00000001

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111110  00000000  00000000  00000000  00000000  00000000

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  00000000  00001111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000111
```



```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111100  00000000  00000000  00000000  00000000  00000000  00000011

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11100000  00000000  00000000  00000000  00000111

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11110000  00000000  00001111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6000  11111111  00000000  00000000  00000000  00000000  00000000  00000000  00000000
6100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700
```

```
AUTPTR  0010        ERR6    5602        M20     0162        PARAM   0021
CHAR    0031        ERR7    5617        M23     0163        PASCNT  0040
CHAR2   0032        ERRNM   0024        M25     0164        PASMSG  5057
CHECK   4464        ERROR   4463        M3      0155        PCLF    6662
CHKNR   0114        ERRPC   0025        M30     0165        PCLP    6666
CHKOCT  0113        ERRS    5055        M35     0166        PCMSG   5043
CKCNT   0037        ETSTNO  5036        M36     0167        PDIGIT  0122
CKEXIT  3013        EXIT    5465        M4      0156        POCT    3565
CKFLAG  0054        EXIT1   3036        M40     0170        PRINT   4461
CKSRV   3000        EXIT2   3047        M56     0171        PRSP1   5171
CKSTOP  3015        EXIT3   3037        M7      0157        PRSP2   5202
CLDI    6132        FF      5442        MIOT    2716        PRSP3   5206
CLEI    6131        GETSW   4521        MIOTA   2731        PRSP4   5222
CLSK    6133        GOUT    0115        MIOTB   2730        PRT     4216
CNTLU   5445        HDRX    4326        MIOTC   2750        PRTCHR  4260
CNVMSG  5435        HEADER  4716        MLOAD   4460        PRTCL   4254
CNVNM   3761        HOLD    4457        MSGADR  0043        PRTCR   4251
CNVRT   3713        HOLDCH  3141        MSGPTR  3762        PRTFF   4246
COLMN   5030        HUNDS   0046        NCMSG   5231        PRTHDR  4462
COLUMN  4746        IERROR  0347        OCTSAV  3712        PRTLF   4257
CONTRL  0217        IERRT   3650        ONES    0044        PSIE    6665
COUNT   0034        INFLAG  3326        OP1CHK  3142        PSKF    6661
COUNT2  0035        IOTAB   4535        OP1CLF  2653        PSTB    6664
CR      5437        IOTSEL  0030        OPDBST  2643        PTRIOT  0027
CRLF    5441        ISAVE   3016        OPLOD1  2663        QUES    5443
DBCE    6576        ISRV    0002        OPLOD2  2707        RCHECK  3107
DBCF    6573        KBTAB   3400        OPSCIF  2675        READ    0111
DBRD    6572        KFA     3313        OUT     4022        READ0   4401
DBSE    6575        KFB     3221        OUTCHR  4053        READ1   4403
DBSK    6571        KFC     3246        OUTCL   4044        READ2   4407
DBSS    6577        KFD     3262        OUTLF   4051        READD   4457
DBST    6570        KFE     3276        P10     0130        READQ   4451
DBTD    6574        KFF     3232        P100    0143        READT   4504
DELAY   0333        KYBDA   3433        P1000   0152        READU   4454
DELAY0  0345        KYBDAA  3422        P12     0131        RERRDR  3500
DELAY1  0346        KYBDB   3447        P134    0144        RESTRT  0213
DSMSG1  4766        KYBDC   3324        P15     0132        REXIT   3017
DSMSG2  4772        KYBDF   3200        P177    0145        RFLAG   4503
EMAT    4700        KYBOST  3405        P2      0125        RGETSW  0322
ERR     5447        LF      5444        P200    0146        RHOLD   3123
ERR1    5476        LIERR   0125        P204    0147        RHOLDA  3136
ERR10   5640        LOAD    4456        P36     0133        RKCC    2605
ERR11   5655        LPCNT   0036        P377    0150        RKRB    2613
ERR12   5676        LREADT  0124        P40     0134        RKRS    2610
ERR13   5711        LTSQ    0573        P400    0151        RKSF    2600
ERR14   5733        M1      0153        P41     0135        RLA     4062
ERR15   5755        M100    0172        P55     0136        RLB     4066
ERR16   5777        M12     0160        P57     0137        RLC     4075
ERR2    5511        M144    0173        P60     0140        RLDC    4103
ERR3    5527        M15     0161        P7      0127        RLDCC   4104
ERR4    5546        M177    0174        P72     0141        RLOAD   4050
ERR5    5561        M2      0154        P77     0142        RNLOAD  4105
```



```
RP1     4205        T00     0552        T27B    2075        TERR    2541
RPCLF   2646        T0P     0570        T27C    2107        TERROR  0063
RPCLP   2702        T0Q     0600        T27D    2115        TEST0   0400
RPDIGT  3660        T0R     0620        T27DA   2122        TEST1   0714
RPRHDR  4262        T0S     0625        T27E    2123        TEST2   1000
RPRINT  4200        T0U     0660        T27TAB  2142        TEST20  1200
RPSIE   2670        T0V     0707        T27X    2137        TEST21  1227
RPSKF   2634        T0W     0656        T2A     1015        TEST22  1274
RPSTB   2656        T1A     0725        T2B     1023        TEST23  1331
RSAVE   3645        T1MSG1  5355        T2C     1030        TEST24  1400
RT1     4011        T1MSG2  5361        T2EM    5151        TEST25  1600
RT2     4005        T1MSG3  5375        T2M1    5067        TEST26  2000
RTCF    2523        T1MSG4  5412        T2M2    5105        TEST27  2054
RTLS    2631        T1TAB   5447        T2M3    5126        TEST30  2200
RTPC    2626        T20A    1203        T2PA    1047        TEST31  2212
RTSF    2616        T20B    1211        T2PC    1063        TEST60  2246
RTYPE   4000        T20C    1216        T2PD    1070        TEST61  2400
SAVE    0033        T20D    1222        T2PE    1102        TEST62  2450
SAVEAC  3156        T21B    1232        T2SI    1132        TEST63  2477
SELECT  3054        T21C    1243        T2SP    1044        TEXIT   0065
SELTST  4755        T21D    1247        T2SPD   1114        TGETSW  0121
SETSKP  1540        T21W    1273        T2SPDC  1110        THOLD   0057
START   0210        T22A    1277        T30A    2203        THOUS   0047
START2  0241        T22B    1307        T30M    2210        TKBDST  0066
START5  0274        T22C    1324        T31M1   2240        TKBFG   0107
START7  0306        T23A    1334        T31M2   2243        TKCC    0073
START8  0303        T24A    1410        T60A    2250        TKRB    0075
START9  0277        T24B    1415        T60B    2253        TKRS    0074
STARTB  0266        T24C    1417        T60C    2263        TKSF    0072
STARTX  0221        T24D    1431        T61A    2402        TLOAD   0056
STRONE  0050        T24E    1446        T61B    2404        TLOOP   0052
SVTST   4331        T24F    1466        T61C    2425        TMIOT   0071
SWITCH  0020        T24G    1476        T61D    2430        TMLOAD  0060
T0AA    0415        T24H    1403        T61E    2436        TPCLF   0103
T0AS    0420        T24S    1477        T61F    2445        TPCLP   0106
T0AC    0403        T24SA   1505        T62A    2462        TPFLG   0053
T0B     0432        T24SB   1512        T62B    2470        TPOCT   0123
T0C     0435        T24SC   1504        T63A    2516        TPRHDR  0062
T0E     0456        T25A    1630        T63B    2507        TPRINT  0061
T0F     0451        T25B    1655        T63C    2526        TPSIE   0105
T0H     0472        T25C    1701        T63D    2532        TPSKF   0102
T0I     0475        T25D    1702        T63E    2535        TPSTB   0104
T0K     0510        T25E    1715        TABPTR  0041        TREAD   4400
T0L     0517        T25F    1727        TAT     4600        TREADQ  0112
T0M     0532        T25G    1740        TCHAR   5244        TRONE   0051
T0MIOT  0536        T25S    1745        TCHECK  0064        TSEL    3465
T0MSG0  5250        T26A    2003        TCHKNR  4520        TSEL1   3542
T0MSG1  5270        T26B    2005        TCKOUT  4510        TSEL2   3552
T0MSG2  5302        T26C    2007        TCKSRV  0120        TSELCT  0067
T0MSG3  5320        T26D    2037        TCNVRT  0117        TSELX   3555
T0MSG4  5335        T26TAB  2047        TDELAY  0116        TSTNM   0023
T0W     0543        T27A    2057        TENS    0045        TSTNO   5020
```

```
        T67PTR  0042
        TTAT    0270
        TTCF    0077
        TTLS    0101
        TTPC    0100
        TTSEL   0110
        TTSF    0076
        TTYIN   3325
        TTYPE   0055
        TYPE    4455
        WIDTH   0026
        WTMSG   4777


ERRORS DETECTED: 0

LINKS GENERATED: 12

RUN-TIME:  17 SECONDS

38K CORE USED
```

```
AUTPTR     44#   1663   1669   1684   1946   1954   1964   1975   2018   2019   2024   2035
CHAR       62#    715    718    723    725    729    913    915    920    922    941    962    984    985
          998   1129   1130   1134   1139   1148   1151   1153   1154   1159   1303   1305   1394   1402
         1404   1440   1449   1452   1503   1508   1534   1535   1540   1544   1549
CHAR2      63#    713    714    741    747    963    964    969    970    975   1010   1011   1016   1018
         1170   1171
CHECK     191#    370    386    402    425    440    454    464    478    497    521    546    577    627
         1498   1531   2262
CHKNR     132#   1955   1965   1976
CHKOCT    131#   2020   2025
CKCNT      69#    701   1703   1710
CKEXIT   1702   1704   1712#
CKFLAG     87#    660    700    734    761   1709
CKSRV     136   1701#
CKSTOP   1707   1715#
CLDI      211#    250    751   1753   2000
CLEI      210#    706
CLSK      212#   1701
CNTLU    1877   2463   2684#
CNVMSG    771    773    782    784   1425   2172   2399   2678#
CNVNM    2157   2161   2195#
CNVRT     135   2156#  2193
COLNN    2401   2652#
COLUMN   1942   2646#
CONTRL    236    247#
COUNT      65#    613    717    720    805    812    817    832    835    840    847    886    893    898
          915    961    966   1005   1013   1066   1072   1091   1097   1108   1109   1120   1126   1144
         1150   1160   1173   1204   1214   1227   1280   1296   1329   1332   1385   1393   1445   1460
         1465   1472   1507   1661   1677   1947   1959   1961   1969   1971   2015   2295   2296   2421
         2456   2486   2467   2469
COUNT2     66#    953    954    977    981    983
CR        617    843    853   1230   1354   1362   1397   2679#
CRLF     1505   1528   1553   1684   1696   2057   2101   2681#
DBCE      223#   1639
DBCF      220#
DBRD      219#
DBSE      222#   1637
DBSK      219#
DBSS      224#   1628   1652
DBST      216#   1627   1616   1647
DBTO      221#   1626   1650
DELAY     134    276    334#    343
DELAY0    336    339    345#
DELAY1    338    341    346#
DSMSG1   1862   2648#
DSMSG2   1866   2649#
EMAT     2100   2621#
ERR      2095   2655#
ERR1     2621   2702#
ERR10    2628   2709#
ERR11    2629   2710#
ERR12    2630   2711#
ERR13    2631   2712#
```

```
T0B       392     399#
T0C       402#    410
T0E       411     415     422#
T0F       425#    433
T0H       430     437#
T0I       440#    450
T0K       447     454#    460     474
T0L       457     464#
T0M       471     479#    486     493
T0M1OT    482#    1046
T0M8G0    368     2669#
T0M8G1    384     2670#
T0M8G2    400     2671#
T0M8G3    423     2672#
T0M8G4    438     2673#
T0N       483     487#
T0O       498     497#    513
T0P       499     511#
T0Q       514     521#    542
T0R       523     530#
T0S       536     546#    570
T0U       577#    585
T0V       579     601#
T0W       540     571#
T1A       610#    642
T1M8G1    631     2674#
T1M8G2    637     2675#
T1M8G3    619     2676#
T1M8G4    625     2677#
T1TAB     610     2688#
T20A      804#    822
T20B      810#    818
T20C      809     815#
T20D      814     819#
T21A      833#    841
T21C      837     842#
T21D      846#    862
T21W      845     846     855     856     858     867#
T22A      879#    903
T22B      887#    899
T22C      895     900#
T23A      914#    924
T24A      947#    951
T24B      949     952#
T24C      954#    992
T24D      964#    973     976
T24E      968     977#
T24F      993#
T24G      996     1001#
T24H      942#    1001
T24S      958     978     1005#   1007    1015
T248A     1011#   1037
T248B     1016#   1021    1024    1027    1030    1033

T248C     1010#   1036
T25A      1077    1092    1088#
T25B      1113    1117#
T25C      1129#   1133
T25D      1130#   1140
T25E      1136    1141#
T25F      1151#   1161
T25G      1157    1160#
T25S      1076    1081    1086    1112    1115    1135    1168#   1175    1177    1178    1180
T26A      1201#   1236
T26B      1203#   1232
T26C      1205#   1228
T26D      1216    1229#
T26TAB    1199    1238#
T27A      1253#   1300
T27B      1264    1267#
T27C      1273    1277#
T27D      1276    1283#
T27DA     1280    1288#
T27E      1282    1289#
T27TAB    1251    1305#
T27X      1294    1301#
T2A       673     682#
T2B       688#    691
T2C       679     696#
T2EM      675     677     2661#
T2M1      683     2658#
T2M2      685     2659#
T2M3      687     2660#
T2PA      714#    745
T2PC      718#    727     730
T2PD      722     731#
T2PE      736     741#
T2S1      763     768#
T2SP      692     711#    746
T2SPD     740     754#
T2SPDC    750#    1715
T30A      1330#   1333
T30M      1331    1336#
T31M1     1346    1365#
T31M2     1350    1366#
T60A      1381#   142#
T60B      1394#   1406
T60C      1392#   1399
T61A      1444#   1481
T61B      1446#   1471    1474
T61C      1443    1454    1457    1463#
T61D      1462    1466#
T61E      1469    1472#
T61F      1476    1479#
T62A      1500#
T62B      1506#   1512
T63A      1536#
```

```
T63B     1529#   1551    1584
T63C     1544#
T63D     1548#
T63E     1543    1547    1552#
TABPTR     70#     30#     309     611     620     632     638     639     640    1200    1205    1217    1235    1252
          1255    1271    1292    1299    1672    1673    1676    1687    1688    1691    1738    1739    1774    1775
          2030    2031    2423    2428    2430    2434    2438    2442    2451    2455    2473    2474    2480
TAI       112    2581#
TCHAR    1495    1526    2668#
 CHECK    108#     191
TCHKNR    132    2496    2509#   2521
TCKOUT    131    2495#   2502
TCKSRV    136#     698
TCNVRT    135#     769     780    1423    2397
TDELAY    134#     374     390     406     414     428     444     468     487     557     588
TENS       75#    1253    1256    1262    2159    2167    2181
TERR     1493    1524    1556#
TERROR    187#     192
TEST0     367#    2551
TEST1     609#    2552
TEST2     666#    2553
TEST20    801#    2567
TEST21    830#    2568
TEST22    876#    2569
TEST23    911#    2570
TEST24    939#    2571
TEST25   1064#    2572
TEST26   1198#    2573
TEST27   1250#    2574
TEST30   1327#    2575
TEST31   1342#    2576
TEST60   1379#    2600
TEST61   1442#    2601
TEST62   1490#    2602
TEST63   1521#    2603
TEXIT     109#     188
TGETSW    137#     195
THOLD     103#     190
THOUS      77#    1411    1413    1420
TKBDST    110#     297    1923    2014
TKBFG     127#    1720    1761    1786
TKCC      115#     501     525     558     589     702
TKRB      117#    1499    1532    1848    1869    2426
TKRS      116#
TKSF      114#    1496    1529    1808    1866    1867    2424
TLOAD     102#     189
TLOOP      82#     267     994    1729    1758    2004    2051
TMIOT     113#     274
TMLOAD    104#     194
TPCLF     123#     495     503     527
TPCLR     126#     273     373     389     405     413     443     481     551     582    2277
TPFLG      84#     288     291     295    1491    1522    1802    1843    2079    2209
TPOCT     139#    1864    2093    2097


TPRHDR    106#     196
TPRINT    105#     193
TPSIE     125#     252     505     529     535     539     561     567     572     592     596     602     705    1755
          2082
TPSKF     122#     375     391     407     439     445     456     469     488     554     589    2274
TPSTB     124#     467
TREAD     129    2417#   2444
TREADQ    130#    1903    1987    2016    2033    2055    2499    2514    2518
TRONE      81#     269    1732    1757    2003    2042
TSEL      128    1999#
TSEL1    2040    2045#
TSEL2    2049    2053#
TSELCT    111#     298     305    1728    1793
TSELX    2043    2052    2056#
TSTNM      54#     241     245     248     292     301     307    1735    1737    1747    1771    1773    2023    2026
          2027    2029    2084    2088    2372    2375    2379    2385    2392
TSTNO    2378    2661#
TSTPTR     71#     312     313    1742    1743    1778    1779    2034    2058
TTAT      112#     306    1736    1772    2028
TTCF      119#     502     526     559     590     703
TTL6      121#     275    1500    1536    2247    2252    2452
TTPC      120#
TTSEL     108#    1734    1899    1902    1919    1988
TTSF      118#     277    1501    1537    2248    2253    2453
TTYIN    1859    1888    1900    1908    1911    1927#
TTYPE     101#     187
TYPE      187#     288     367     383     399     422     437     618     622     624     676     692     694     696
           757     764     772     776     781     787    1494    1504    1525    1527    1552    1805    1861    1865
          1876    1883    1895    1941    2008    2056    2082    2090    2094    2098    2105    2107    2459    2462
WIDTH       57#     256     258     262     266     716     778     804     831     860     879     883     945     957
           960    1871    1100    1125    1149    1203    1277    1281    1384    1392    1444    1464    1506    1943
          1961    1973    1974    1978    1979    1981    1985    2395
WTMSG    1806    2650#
.L0374    337     356#
.L0375    290     357#
.L0376    265     358#
.L0377    244     359#
.L0575    499     515#
.L0576    479     516#
.L0577    409     517#
.L0773    610     647#
.L0774    579     648#
.L0775    552     583     649#
.L0776    548     650#
.L0777    523     651#
.L1177    696     791#
.L1375    858     927#
.L1376    815     928#
.L1377    810     929#
.L1574   1048    1051#
.L1575   1046    1052#
.L1576   1045    1053#
.L1577    956    1054#
```

```
,L1767    1155    1182#
,L1770    1147    1183#
,L1771    1127    1184#
,L1772    1119    1185#
,L1773    1110    1186#
,L1774    1096    1187#
,L1775    1090    1104    1143    1189#
,L1776    1080    1189#
,L1777    1067    1092    1098    1106    1121    1145    1190#
,L2175    1288    1313#
,L2176    1251    1314#
,L2177    1199    1315#
,L2375    1417    1430#
,L2376    1414    1431#
,L2377    1390    1432#
,L2577    1549    1559#
,L2775    1674    1689    1694#
,L2776    1662    1695#
,L2777    1601    1612    1621    1632    1643    1696#
,L3177    1746    1834#
,L3574    2047    2060#
,L3575    2046    2061#
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,V7000     298     357#
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,V7767    1127    1184#
,V7770     337     356#
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